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AUTHOR Tobias, Audrey Sylvia
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ABSTRACT

This study reports an analysis of some aspects of the use of periodicals by freshmen at the University of North Carolina, as related to the undergraduate and other campus libraries. The study also asks whether the dispersion of citations, among periodicals cited by freshmen in bibliographies of required term papers, conforms to a general law of distribution. The method used is citation analysis, with computer assistance to manipulate data. A major finding is that the dispersion of citations among titles is a faithful expression of a general law of distribution described as the Yule curve. It was also found that whereas the very few periodical titles which yield the bulk of the citations are housed in the undergraduate library, the vast majority of titles are housed in the Wilson Library. The undergraduate library provided access to the great majority of citations through "Reader's Guide," but students also made heavy use of unindexed materials. (Author)

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PERICDICAL CITATIONS BY FRESHMEN USING CHAPEL HILL'S UNDERGRADUATE LIBRARY

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by

Audrey Sylvia Tobias

A research paper submitted to the faculty of the School of Library Science of the University of North Carolina at Chapel Hill in partial fulfillment of the requirements for the degree of Master of Science in Library Science.

Chapel Hill

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Approved by:

Kenneth D. Shaw

Adviser

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CHAPTER 1

INTRODUCTION AND SURVEY OF THE LITERATURE

This study will describe the use of periodicals by freshmen in a given situation. It is not a sociological study but a citation analysis, which goes beyond the production of a list of most frequently cited titles, to relate the citations to library locations on campus and to indexing sources.

The research is designed to provide a body of information for the use of the Undergraduate Library of the University of North Carolina at Chapel Hill (hereinafter referred to as UNC), which could be used in collection building or in other operational decisions. It will also indicate directions for further research into periodicals use by undergraduates. The term "periodicals" will be used interchangeably with "journals" throughout this paper.

Concurrently, there will be an attempt to determine whether the distribution of citations which form the raw data of this study, conforms to the general law of distribution of certain classes of data, described by Simon[1] as the Yule distribution.

The Undergraduate Library

Profound changes in post-secondary education following World War II permanently altered the character as well as the size of the student population. The spread of the democratic ideal, which would accommodate

the goal of "college for all," federal grants to war veterans and to universities, community pressures to relax admission standards - all these pressures have led to unprecedented enrolment in universities. The communications revolution, the information explosion, the exponential growth and obsolescence of recorded knowledge - these developments have led to changed expectations on the part of young people.

UNC shares with other universities new demands and new pressures upon its faculty and facilities; the Undergraduate Library at UNC, as elsewhere, was established to remove pressure on facilities designed essentially for graduate students and to meet the needs of numbers on a high-volume basis. The Undergraduate Library at UNC serves a massive, heterogeneous body of some 12,000 undergraduates, of whom 3,000 are freshmen.[2]

There is a mounting sense of unease among many librarians in academic communities as to whether periodicals currently held are those which most effectively reflect their needs and interests. This problem is intensified by the wide range of ability and interests represented in the student body, the increasing range of options, and the shift away from text-centered teaching. In addition, enlightened thinking in the library community encourages the development of selection policy based on user needs and scientific, ordered study of the community. It is therefore no longer sufficient to base selection policy (particularly for periodicals) solely on experience, published shelflists or expert advice.

D. W. Schneider, Librarian of the Undergraduate Library at UNC, is keenly interested in developing a body of information upon which

selection policy for periodicals may be soundly built. It is hoped that this study will provide information to enhance this aim.

The Data

This study would not have been possible without co-operation between the English department and the Undergraduate Library, which led in turn to the release of data for research purposes. The English department released to Brian Nielsen, Reference Librarian at the Undergraduate Library, some 1600 argumentative research papers written by freshmen registered in English 2 during the Spring Semester of 1972. This investigator, in turn, was permitted complete access to these papers for research,[3] and used the periodicals cited in the bibliographies as the foundation for the study.

Librarians find these term papers particularly attractive for research because of the original assignment given to the students by the English department. The research paper is a central requirement in English 2, with emphasis not only on planning, organizing and writing the 3000-word, footnoted essay with bibliography, but on library research. Students are encouraged, indeed expected, to cite periodical literature[4] and are urged to search beyond the card catalog and beyond Reader's Guide to Periodicals (hereinafter referred to as Reader's Guide), for subject headings. Students were expected to choose a topic of genuine interest to them; other than that there was generally no restriction on the subject matter.

Limitations of This Study

The limitations of this study must be carefully noted:

(1) The Undergraduate Program lasts four years, while data available pertain only to freshmen, and only those registered in English 2. Any conclusions, therefore, purporting to reflect the pattern of use of the whole undergraduate body is precluded.

(2) A distinct group of top students of English 2 have been exempted from this course so that only average students are left.[5] This is not necessarily a disadvantage: this explanation is simply a contribution to an understanding of the population studied.

The advantages may be characterized thus:

(1) Since English 2 is mandatory for nearly all freshmen, it cuts across all lines of interest, all races, all backgrounds, both sexes, and reflects the teaching of 76 instructors of English.

(2) The data are available, definite, and recently gathered.

Relevant Literature

Over the past fifty years, quantitative analysis of periodical literature has followed two lines of development: citation analysis and production analysis. Both seek more precise information about the useful literature of a subject, although one counts citations to periodicals and the other counts articles published in a periodical. This piece of research uses citation analysis.

Citation Analysis

Citation analysis involves counting, classifying and analysing citations in various types of literature. A fruitful comparison may

be made between traditional citation analysis and this study, even though there are important differences in method and aim. These differences will be dealt with later.

The pioneer work in citation analysis was done by Gross and Gross,[6] who in 1927 sought a method of selecting chemical journals most apt to be of value to researchers in the field. The method employed by Gross and Gross has been used, with variations, to the present day. One variation is in the number of journals used as sources for citations. Gross and Gross drew upon citations from only one journal, using one year's issues, but since that time most citation analysts have used several journals as source material. Once the citations are counted, the journals are ranked in order of frequency of citation, to produce a list of most frequently cited journals in the field.

One value of such lists is the practical aid they furnish to librarians in the selection and acquisition of serials. The danger is that many librarians rely on such lists blindly without considering their limitations or without regard to the opinions of specialists, to reviews, or to circulation figures. In his discussion of scientific serials, Brown warns of this danger when he says that

> One of the most serious difficulties in the use of most cited lists is caused by the belief that these lists are the final word. The opinion of scientists in any university should be requested before any final commitment to purchase is made.[7]

Vickery[8] noted in 1953 that circulation figures of periodicals borrowed may provide a more reliable guide to the most used journals than citation counts. Recounting the work of Brodman and Postell, two medical librarians, who found that the rankings of journals based on circulation figures did not correspond to the ranking based on citation

counts, Vickery urged the use of at least three aids to selection: advice of subject specialists, citations in standard journals, and circulation figures.

A recent study by Heussman[9] tests the relationship between theological citations and library circulation. One of his major findings is that the literature cited by writers is older than the literature circulated by seminaries. While this may be construed as a limitation upon the method, he concludes nevertheless that the citation method, whatever its weaknesses, provides useful information for the operation of a library.

The classic summary of research into the characteristics of subject literatures was done earlier by Stevens[10] who traced the history of citation analysis as well as production analysis and introduced the concept of "title dispersion" - the degree to which the useful literature of a subject is scattered through a number of different books and journals. By comparing the citation studies of Gross and Gross, Henkle, McAnally and others, each in a different field, he found that title dispersion is smallest in the pure sciences, greater in technologies, and greater still in the social sciences and humanities.

Traditional Citation Analysis and the Present Study

This study differs from traditional citation analysis in several essential respects:

(1) It does not limit itself to a specific subject field, much less a scientific field.

(2) It does not derive its citations to periodicals from published authors, specialists, or recognized researchers, but from amateurs,

beginners in the academic world: freshmen.

(3) It seeks, in part, a list of most frequently cited titles, but it does not proceed from the assumption that the most frequently cited titles are the most important ones for an undergraduate collection, nor is the focus of the study on the most frequently cited titles. On the contrary, the study is directed toward the next group of titles, the ones in moderate to heavy use.

(4) Although lists derived from citation analyses have often been used by librarians as guides to collection building (indeed that has been their purpose in the main), citation analyses themselves have seldom, if ever, been associated with a particular library but rather with a particular field of inquiry. The present investigation covers no particular field of interest but is associated with a particular geographic locality, age group and class level.

The similarity is in the attempt at quantitative analysis of the citations, whether the citing authors be specialized researchers or undergraduates.

Distribution Theory

In citation distribution it has been observed repeatedly over the past forty years that only a very few titles receive most of the citations, while a very large proportion receive one or two citations. Similarly, in production analysis, it has been found repeatedly that a very few periodicals publish most of the useful literature in the field. It is in the statistical analysis of this phenomenon of concentration and scatter, and the search for a general theory of distribution, that the interest of this study lies.

Bradford was among the first to recognize that the scatter of useful papers among scientific journals has a common pattern. His classic law of scatter is stated thus:

> If scientific journals are arranged in order of decreasing productivity of articles on a given subject, they may be divided into a nucleus of periodicals more particularly devoted to the subject and several groups or zones containing the same number of articles as the nucleus, where the number of periodicals in the nucleus and succeeding zones will be as $1 : n : n^2 : \ldots$ [11]

The series $1 : n : n^2 : n^3 \ldots$ expresses the ratio between the number of periodicals in the nuclear zone and the number in each succeeding zone, in simple geometric progression. The number of periodicals in each zone increases in a constant ratio, while the number of articles produced by each zone remains roughly the same.

To explain further: let the number of periodicals in the first zone be P_1; the number in succeeding zones be P_2, P_3 ... Then

$$\frac{P_2}{P_1} = n; \quad \text{and}$$

$$\frac{P_3}{P_2} = n$$

where n is the Bradford constant, expressing the ratio of P_2 to P_1, or P_3 to P_2. Thus the ratio of the number of periodicals in each zone to the number in the next zone is as follows:

$$P_1 : P_2 : P_3 : \ldots = 1 : n : n^2 : \ldots$$

This concept has been clearly and simply described by Saracevic[12] in Introduction to Information Science.

When the articles are plotted cumulatively along the y-axis, and the log of the cumulated sum of the journals along the x-axis, the

result is a rising curve which runs into a straight line at a critical point. The number of articles contained in the nucleus is purely arbitrary and may contain any number suitable, although there has been much discussion in recent years about what constitutes a Bradford nucleus.

Bradford's law has lain dormant for twenty years because of ambiguity in its interpretation and because of an apparent disparity between the verbal and graphic formulation of the law.[13] Furthermore, it is now recognized that two mathematical expressions are required to express Bradford's law - one for the curved part of the graph and one for the linear portion.[14] The dynamic power of this law is only now being recognized. The possibilities of application to library operation are manifold, and lend impetus to the search for an underlying formula.

The present study will not attempt to apply Bradford's law because it reflects occurrence of articles in journals, not the citations to these journals; nor will it attempt to apply the mathematical models developed more recently by Kendall and Dalziel[15] because their models express specifically the dispersion of citations in scientific fields.

Is there a more general law of distribution of which the present study may be an instance? Over a period of years, but independently of Bradford, men like Yule, Zipf, Pareto and others analysed the distribution patterns in a wide variety of phenomena: word frequency, scientific citation analysis, biological mutation, income distribution, population of cities. As early as 1924 the British statistician Yule had used a probability model to explain a biological distribution.

Twenty years later he examined the distribution of word frequencies in text, but saw no connection between these two distributions.[16] It is Simon[17] who is credited with the discovery that the distributions described by all these men had a common pattern, which he named the Yule distribution in recognition of his work. The distributions observed by Simon had the following characteristics in common: "J-shaped, or at least highly skewed, with very long upper tails..."[18] When he could not find any property that these data had in common, he sought an explanation in the underlying probability mechanism rather than in the characteristics of the data themselves. It is this approach that lends it universal applicability.

More recently, Morse[19] described a probability distribution of a different nature still. By plotting the number of activities performed by library patrons against the number performing each activity, he, too, produced a curve shaped remarkably like the Yule distribution.

During the past four years, the literature on the Bradford distribution has grown apace. The statistician Kendall[20] saw in Bradford an instance of Yule. Wilkinson[21] observes that Bradford's empirical law "may be seen as a particular manifestation of a more fundamental law." The Bradford and Zipf distributions have been linked by Brookes[22] and Leimkuhler suggests that "Bradford's law and Zipf's law are just two different ways of looking at the same thing."[23]

These examples, which could be multiplied many times, point to a dawning realization that a distribution model can be of practical use in the rationalization of library operations.

Objectives

In pursuing this study, the investigator has sought answers to the following questions:

1. Does the dispersion of citations appear to follow a general law of distribution.

2. What periodicals are cited, and with what frequency.

3. In which campus libraries are the periodicals held.

4. How are the periodicals indexed; what indexes to students appear to use most heavily.

5. How heavily do students depend on the Undergraduate Library for journals and for indexing sources.

6. In what measure does the Undergraduate Library appear to meet the periodical needs of freshmen, as expressed in the citations.

Summary

This chapter has described the nature of the problem to be investigated, placed it in its historical setting, defended its virtue as a piece of research, noted its limitations, and offered a survey of relevant literature. Finally, the specific objectives of the investigation were set out in a series of questions.

CHAPTER 2

THE METHOD, MATERIALS AND PROCEDURES USED

This chapter will describe the data and their source, the sampling procedure, the recording and verification process, the selection of a computer program, the coding decisions, the transfer of data to machine-readable form, and the limitations of the method.

The source material available, it will be recalled, is some 1600 freshman English term papers written during the spring of 1972. The citation data are drawn from the bibliographies of a sample of the term papers. It was decided to use as large a sample as possible which would still be within manageable proportions, because the larger the sample, the greater the number of actual titles revealed, the clearer the trends and the smaller the probability of error in the analysis of sub-samples.

The Sample

The Freshman term papers were written in 79 sections, with an average of 19 students per section.[24] A random sample of 25 entire sections was taken, representing roughly 450 students and 1500 citations to periodicals. The sample was chosen in this fashion:

(1) Sampling without replacement. No section or instructor was chosen more than once.

(2) Because 18 instructors taught two sections each, the sample was stratified. One stratum included instructors who taught one section

each, and the other included those who taught two sections each. This insured that the influence of the instructors on the population is reflected as nearly as possible in the same proportion in the sample.

(3) Selection was made by means of a random number table. The sections were arranged in ascending numerical order, and from the first stratum of 42 sections, 13 sections were selected. From the second group of 37 sections (one instructor taught three sections), another 12 sections were chosen, bringing the working sample to 25 sections representing 25 different instructors.

Recording and Verification Process

The bibliography of each term paper was read, the citations to periodicals identified, and a list of periodicals assembled in alphabetical order.

Verification of the Data

It was necessary to verify the existence and establish the correct title of every periodical. Countless inaccuracies, doubtful titles, imaginative abbreviations, missing words, added words, words misspelled, were encountered. Titles were verified by searching in the following sources, in order, as necessary:

(1) Periodicals and Other Serials Held by the Libraries of the University of North Carolina at Chapel Hill. Chapel Hill: UNC, 1972.

(2) Ulrich's International Periodicals Directory. 14th ed., 2 vols. New York: R. R. Bowker Co., 1971-72.

(3) Standard Periodicals Directory. Edited by Leon Garry. 4th ed. New York: Oxbridge Publishing Co., 1973.

(4) Ayer Directory of Publications. Philadelphia: Ayer Press, 1973.

(5) North Carolina Union List of Bio-Medical Serials. Edited by J. Woodburn. 2d. ed. Durham: Duke University, 1970.

(6) A Checklist of Periodical Titles Currently Received in Medical Libraries in the Southern Region. Edited by John Ische. 2d. ed. New Orleans: Southern Regional Group of the MLA, 1964.

(7) New Serial Titles, 1950-1960. A Union List of Serials Commencing Publication After December 31, 1949. Washington: Library of Congress, 1961.

_____. 1961-65 Cumulation. New York: R. R. Bowker and Arno Pub. Co., 1966.

_____. 1966-69 Cumulation. Washington: Library of Congress, 1971.

_____. 1971 Cumulation. Washington: Library of Congress, 1973.

(8) Union List of Serials in Libraries in the United States and Canada. 3d. ed. New York: H. W. Wilson Co., 1965.

If a title could not be found in any of these references it was eliminated. About 12 were eliminated by this process, in the belief that no information is better than spurious information. The verification process confirmed citations to 244 periodicals.

Assembling of Information

Verification complete, the periodicals were numbered in ascending numerical order to correspond with the alphabetical order in which they had been placed. Newspapers constituted a substantial number

of the periodicals, and were given a special group of numbers for ease of analysis later. The numbers assigned served for control and for coding. To the periodicals list was added two pieces of information:

(1) The location on campus of each journal. This information was obtained from the UNC computer serials printout.[25]

(2) The indexes in which each periodical could be found. At this stage, all libraries in which a serial was held, and all indexes listed, were recorded.[26]

The sex and grade of each student was marked clearly on the term papers. Where the sex was indeterminate (is Robin a boy or a girl?) or the mark missing, information was obtained from records of the English department.

At this time the number of periodicals citations was totalled on each term paper and marked clearly. When a periodical was cited several times on a paper, it was counted only once, in order to focus attention on the variety of journals cited rather than on the number of times it might be cited on one paper. It was discovered subsequently that if the periodicals had been counted every time they were cited, the trends observed would have been exaggerated but not changed.

Citations to monographs were ignored.

The Search for a Computer Program

The search for a computer program was begun early. What was wanted was a complex of programs flexible enough to tabulate and total the data, manipulate sub-groups as desired and compute relationships between the variables, while at the same time coping with the unusually large number of values associated with one variable.[27] Among the alternatives

considered was Datatext, Statistical Package for the Social Sciences (hereinafter called SPSS), and the author's writing a program specifically for this research. Eventually SPSS was decided upon because of its flexibility, its extensive use at UNC giving rise to a body of experience around it, and the ready access to experienced programmers able to offer expert advice and to counter the eccentricities and limitations of SPSS.

Although SPSS is as flexible as any available alternative, it is an awkward, unwieldy tool for this type of research. Some of the difficulties encountered are enumerated here.

(1) It could return a printout of periodicals showing the frequency of citation, but it could not re-arrange this information in the order of frequency of citation. (This had to be done manually).

(2) The particular coding scheme used meant that it could, for example, return for each library coded, the total number of citations yielded by that library but not the total number of journals held in that library. (That operation, too, had to be done manually).

(3) The program as presently constituted cannot print out all the labels for a variable with so many values. One printout was obtained, therefore, with totals for all the data, but many labels describing the data missing. A second set of printouts was returned with all the labels required by selecting only half the data at a time. This gave correct individual raw figures but incorrect totals. Thus it was necessary to search in one set of printouts for labels and in another for total figures and percentages, an awkward procedure at best.

(4) It cannot pick out a like value recorded in a number of variables and assemble this information as one unit to be related to other values. This limitation precluded a scheme of coding which considered each student as one case, with his citations alloted one field each, as: Citation #1, Citation #2 . . . Citation #n. For this approach, the number of variables required to express the citations would be n variables, where n was the maximum number of citations per student.

The reason for dwelling upon this detail is to emphasize the difficulty of finding a program which can manipulate easily the kind of data investigated in citation analysis. There are many and varied computer programs available to meet the needs of social scientists at every level, from undergraduate exploration to advanced research. Yet there is not the same wealth of software available to meet the varied requirements of library research. In the field of statistical bibliography, Barker[28] has provided an excellent summary of four types of library research:

(1) Opinion studies and questionnaires used to identify literature important to the user.

(2) Behavioral studies based on recorded observations, interviews, and diaries, to uncover the information-gathering techniques of researchers.

(3) Circulation and reference records as evidence of literature use.

(4) Quantitative studies utilizing analyses of bibliographic citations.

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The first two types of study can use to great advantage, an excellent complex of programs like SPSS which is designed to meet the needs of social scientists who depend heavily on statistical formulae and on significant correlations between variables, but who normally have only a modest number of values associated with any one variable. The fourth type of research, directed toward the study of literature, requires different manipulations from the analysis of human behavior, and different programs. Do programs exist to meet this need? Undoubtedly they do exist and have been used, but the unhappy truth is that they are not known widely in the library community. It is the personal judgment of this author that a statistical survey like that of Barker implies the existence of such a program. His sophisticated investigation involved analysis, tabulation and cross-manipulation of 10,000 citations and 547 individual titles, by frequency of citation. Barker's survey would have been next to impossible without appropriate programming assistance.

Although he described the coding process, the routine keypunching and verification steps, and although he did, of course, acknowledge the essential support of Dr. W. F. Acheson, Director of the Rich Electronic Computer Center at Georgia Institute of Technology, it is curious that he made no mention whatsoever of the computer program itself, an essential tool of the exercise.

How did Barker overcome the difficulty of manipulating large numbers of values and of relating subgroups within values to one another? The inference drawn by this researcher is that Barker described his needs to an expert computer programmer who either developed a program to perform the needed functions, altered an existing pr[illegible]ram

a subroutine to re-arrange Barker's data in a form acceptable to an existing program. It is conjectured that Barker, concentrating upon other aspects of his research, may never have become fully aware of his dependence upon the work of program and programmer, nor on the incalculable value of such a program to the library community were it available.

Barker and other investigators notwithstanding, if it is conceded that there is a vital place for citation survey in library research, then there is an equally vital place for software to provide the sophisticated analysis required by modern conditions.

All the evidence points to the need for librarians to do quantitative research into aspects of their work. Yet without proper tools to enhance such activity, they cannot make significant progress. The suggestion is, then, that librarians should press on to develop, or have developed, computer programs adapted to their peculiar needs. It is not for a moment suggested that computer programs will of themselves usher in the millennium in librarianship. Nevertheless, given the tools, the workers can do a better job.

Coding

Coding is closely linked with the selection of a program. Where a computer program is utilized in research, the success of the research hinges upon the coding, insofar as coding is the method whereby the researcher selects the information to be analysed and tells the memory bank how it is to be classified. Coding is the process of transforming the raw data into language (usually numbers) that the computer can record efficiently and return in whatever form desired, upon request.

It is essential that the researcher understand thoroughly the tool he is using. The better he understands the tool, the better he can use it to good advantage. It is necessary to know that the tool can do, what it cannot do, what it can perform only with difficulty and how it must be altered or modified to work with the data submitted.

Selection of a Coding Scheme

In this instance, the data to be coded were the citations of 416 students who amongst them had made citations to 244 periodicals. Alternative approaches to coding were considered:

(1) Consider each student to be a case, and each of the 244 periodicals a separate variable with its own field. For each student, this would necessitate a few "yes" punches and about 240 "no" punches spread over four punched cards. The probability of error in keypunching was so great as to cause rejection of this alternative. Moreover, the attempt to relate periodicals, as a group, to other variables, would have required extensive instruction to the computer.

(2) Consider each periodical to be one case. This was rejected as impossible without doing all the counting manually first and would have defeated the purpose of using the computer.

(3) Consider each citation to be one case. This method was adopted as providing the best key to the information. The chief difficulty here, already alluded to, was that it was possible to elicit information about the citation counts per journal, and relations between citations and other variables, but not between the number of journals and other variables.

Analyses to be Made

In order to keep both lines of approach open, it was decided to code information both about the citing students and the periodicals. From the term paper the section, grade, sex and number of citations per student was coded, and the names of the periodicals cited ascertained. From the periodicals list, the code number of the periodical, the library location and indexing source was recorded.

Priorities

If a journal had changed title, the citations were all consolidated under the most recent title.

Library.--When a periodical was held in more than one library on campus, it was attributed to one library, in this order of priority:

(1) Undergraduate Library
(2) Wilson Library
(3) Health Sciences Library
(4) Institute of Government Library
(5) Miscellaneous Libraries
(6) Not on Campus

The order of priority was established by considering the degree of accessibility to freshmen.

Index.--Many journals are indexed in several indexes. Since this paper focuses attention on the Undergraduate Library and on the degree of bibliographic access students have through the Undergraduate Library, the decision was taken to record only one index for each journal, in an order of priority. The first three listed are those

available in the Undergraduate Library. The next three were selected and ranked on the basis of information from three sources: (a) material assembled by the author to show in which indexes each periodical was indexed (b) list of indexes held in Wilson and Health Sciences Library (c) discussion with D. W. Schneider, Librarian of the Undergraduate Library. The category named Miscellaneous indexes includes national newspapers and any others appropriate to this heading. The order of priority reads:

(1) Reader's Guide

(2) Social Science and Humanities Index (hereinafter called SSHI)

(3) Public Affairs and Information Service (hereinafter called PAIS)

(4) Education Index

(5) Psychological Abstracts

(6) Index Medicus

(7) Miscellaneous indexes

(8) Not indexed

Coding the Data

The coding was done on regular coding sheets, as illustrated in Figure 1.

Columns 1 to 4 express the identification number of the case.

Columns 6 to 7 show the Section to which the term paper belonged.

Columns 8 to 10 were used for a student number - an interim number assigned for control and verification but not punched.

Columns 11 and 12 represent the student's grade and sex.

Columns 13 to 14 designate the number of periodical citations per student. Subsequent citations for the same student show a missing value

in these columns. The decision to record citations only once for each student made it possible to ascertain the total number of students sampled.

Columns 18 to 20 record the number assigned to the periodical cited.

Column 21 indicates the library location of the periodical.

Column 22 shows the index in which the periodical was indexed.

Although not all the input data were subsequently analysed, the decision at the time was to compile as much information as possible for later analysis if desired.

Other Steps

The coded data were punched onto punch cards, verified against the raw data, a file created and a series of manipulations of data made, to establish the bases for the analyses to follow in succeeding chapters.

	CITN #	SECTION	GRADE SEX CTCNT	JOURNAL LIBRARY INDEX
	1 | 2 3 4 5	6 | 7 8 9 10 11 12 13 14 15 16	17 18 19 20 21 22 23 24 25 26 27	
1	0 0 2 3	0 7	0 1 1 2 2 0 5	0 7 6 9 8
2	0 0 2 4	0 7	2 2 9 9	1 7 5 1 1
3	0 0 2 5	0 7	2 2 9 9	0 6 5 1 1
4	0 0 2 6	0 7	2 2 9 9	1 9 3 1 1
5	0 0 2 7	0 7	2 2 9 9	2 0 3 1 1
6				
7	0 0 2 8	0 7	0 1 2 1 1 0 6	0 1 8 1 1
8	0 0 2 9	0 7	1 1 9 9	0 3 9 2 1
9	0 0 3 0	0 7	1 1 9 9	0 9 8 1 1
10	0 0 3 1	0 7	1 1 9 9	1 1 4 1 1
11	0 0 3 2	0 7	1 1 9 9	2 0 3 1 1
12	0 0 3 3	0 7	1 1 9 9	3 3 4 1 8

Figure 1.--Coding sheet, showing the information which was coded for each citation

Limitations of the Method

Current Issue in the Undergraduate Library.--Some journals are held in the Undergraduate Library for the current issue or for one year only, while the complete run is in the Wilson Library. Such journals were treated as being held in the Wilson Library. Where the citation dates were recent, this decision may have caused a slight distortion in the results, by attributing to the Wilson Library what could have been attained in the Undergraduate Library. However, a scanning of the dates in a number of the citations to such journals showed a very high percentage to be prior to 1971. In these cases the student could not have found the cited article in the Undergraduate Library.

Library.--Although the probability is high that periodicals were used in the location described, one cannot be sure of this. There are two universities nearby with excellent periodical collections, in addition to the fact that some periodicals are duplicated on campus. Therefore leeway must be allowed in interpreting the percentages given. Furthermore, indexes located in the Undergraduate Library, such as Reader's Guide, could just as easily have been used in the Wilson Library.

Indexes.--A number of journals, in particular the medical and educational journals, were indexed in several indexes. In such cases, a student could have found his citation in any one of a number of sources, only one of which was coded. Furthermore, there is no way of confirming a student's use or non-use of any index. Thus the information

gleaned about the use of indexes must be interpreted very conservatively.

Citation Dates.--Current and retrospective issues have all been lumped together. Therefore any attempt at analysis based on recency or obsolescence is ruled out.

Summary

This chapter has described the method used and the approach taken, contrasting the extensive degree of computer software developed in response to social science needs, with the limited software developed for needs peculiar to library and information sciences.

The methods used in this study, and the selection of data to be coded, impose their own limits on the conclusions that may be drawn.

CHAPTER 3

PERIODICALS CITED IN RELATION TO LOCATION AND FREQUENCY OF USE

One purpose of this chapter is to explore the hypothesis that the curve of distribution of citations, described by the data observed, follows a general law of distribution. Another is to describe the location of journals and their frequency of use as part of an attempt to clarify the use being made of the Undergraduate Library under the conditions of this study.

This chapter also lists the periodicals cited, with the practical aim of providing a list of specific titles for workaday purposes. Because ultimately the librarian must deal with individual titles in the process of collection building, selected titles and groups of periodicals are considered in relation to their frequency of citation and location.

Overview

The periodicals cited are remarkable in their variety. In difficulty they range from light reading to scholarly material; in format, from local newspaper to expensive magazine; in subject matter, from religious and sports problems to issues of national concern.

A total of 1286 citations were made by 416 students in the sample. This number referred to 244 periodicals. Of the 416 term papers examined, 112 (27%) were found to contain no periodical citations, only

citations to monographs. The remaining 304 papers (73%) produced the 1286 citations that are examined in this paper. Among papers with periodical citations, the periodical citations per term paper ranged from 1 to 19, with an average of 4.2 citations per term paper.

Table 1 groups the journals into four categories, presents the number of journals in each group and the number of citations furnished by these journals. Figure 2, derived from Table 1, makes it possible to compare graphically the proportion of journals to citations in each of the four groups.

TABLE 1

SUMMARY OF TITLE DISTRIBUTION
(In Order of Decreasing Use)

	Periodicals		Citations	
	No.	Percent	No.	Percent
Jnls in Heavy Use	10	4.1	618	48.1
Jnls in Moderate to Heavy Use	30	12.3	355	27.6
Jnls in Light Use	60	24.6	168	13
Jnls Cited Only Once	144	59	145	11.3
Total	244	100.0	1286	100.0

The first ten journals in rank order account for nearly half of all the citations tabulated. The 618 citations arising from this group account for 48.1% of the total number of citations while the journals themselves represent only 4.1% of the total number of periodicals used. At the other end of the scale, 59% of the journals account for only 11.3% of the citations.

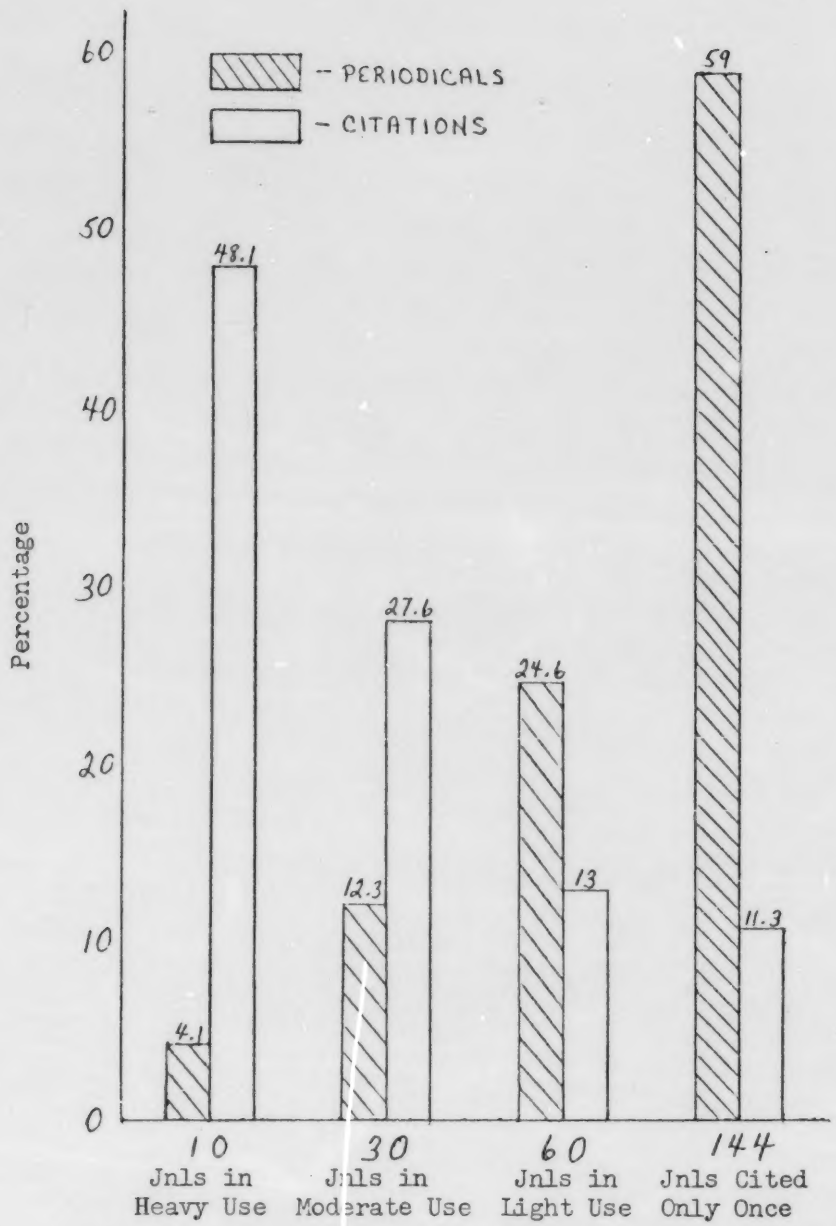

Figure 2.--Proportion of periodicals to citations in each group of periodicals, ranked in order of decreasing use.

Notwithstanding the fact that the cited literature extends over many unrelated topics, dispersion of citations follows the same pattern as that observed in specific subject areas, namely: heavy concentration of citations in a few journals and broad scattering of the remaining citations among many journals.

Title Dispersion

Stevens defines title dispersion as "the degree to which the useful literature of a given subject area is scattered through a number of different books and journals"[29] - a concept already alluded to in Chapter 1. Since the present study encompasses the literature of many subjects and excludes monographs, the appellation "title dispersion" as used by Stevens is not strictly applicable. However, liberties are taken with this definition in order to draw attention to the phenomenon of concentration and scattering which the data in this study reveal.

Figure 3, derived from Table 2, shows the pattern of scattering for the data observed. It is remarkable in its close adherence to the general curve of distribution sometimes described as the Yule distribution. The cumulated journals are ranked in order of decreasing frequency along the x-axis, and the percentage of citations along the y-axis. It will be noted that the curve is J-shaped and highly skewed. Interpreted, this means that there is extremely concentrated use of journals at one end of the spectrum and widely scattered use at the other. Among the most cited titles, the citations of this study are fully as concentrated as the Yule distribution would predict, and among the least cited, are fully as scattered. The extreme scatter of this

TABLE 2

CITATIONS OBTAINED FROM ANY GIVEN NUMBER OF PERIODICALS
(Titles Ranked in Order of Decreasing Frequency)

No. of Periodicals	No. of Citations	Cumulated Citations	Cumulated Percent of Citations
1 - 10	618	618	48.1
11 - 20	166	784	61.0
21 - 30	117	901	70.0
31 - 40	72	973	75.7
41 - 50	47	1020	79.3
51 - 60	34	1054	82.0
61 - 70	27	1081	84.0
71 - 80	20	1101	85.6
81 - 90	20	1121	87.2
91 - 100	20	1141	88.7
101 - 110	11	1152	89.6
111 - 120	10	1162	90.4
121 - 130	10	1172	91.1
131 - 140	10	1182	91.9
141 - 150	10	1192	92.7
151 - 160	10	1202	93.5
161 - 170	10	1212	94.2
171 - 180	10	1222	95.0
181 - 190	10	1232	95.8
191 - 200	10	1242	96.6
201 - 210	10	1252	97.3
211 - 220	10	1262	98.1
221 - 230	10	1272	98.9
231 - 240	10	1282	99.7
241 - 244	4	1286	100.0

distribution bears out the observation of Henkle[30] that the larger the size of the sample, the greater the scatter.

In round figures, Figure 3 shows that:

(a) 60% of the articles are contributed by 20 (8.3%) of the journals.

(b) 80% of the articles are contributed by 48 (20%) of the titles.

(c) 90% of the articles are contributed by 120 (50%) of the titles.

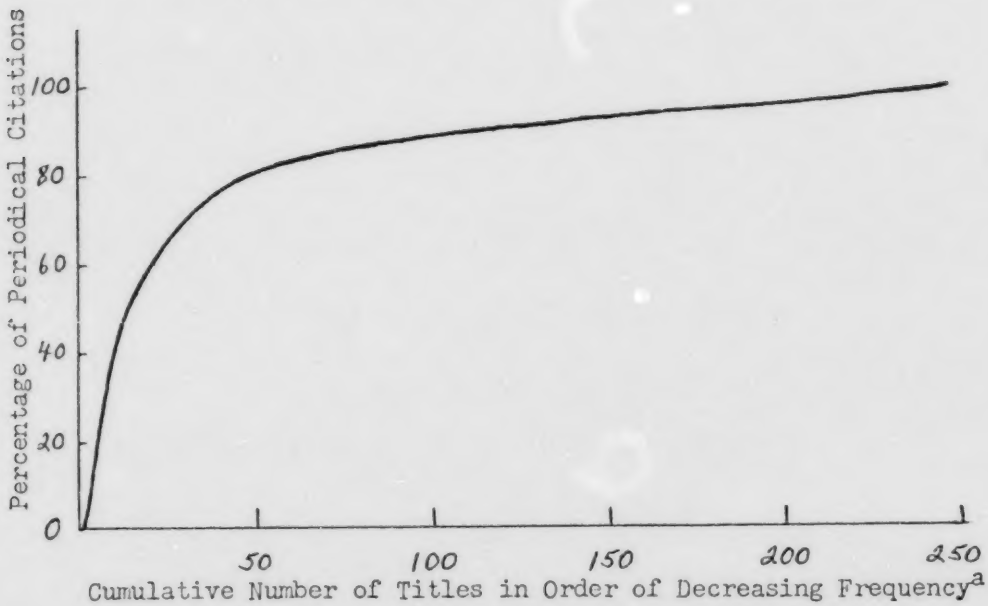

Figure 3.--Number of titles required to obtain any given percentage of citations[b]

[a]Based on the data observed for the present study

[b]Plotted every 10th instance

Application to Practical Use

In a traditional subject field, where the periodicals related to the field are known and can be specifically identified, it is possible to decide upon a percentage of user satisfaction to be offered and cut off periodical subscriptions at that point, by relying on the curve of distribution. This practice is described by Cole,[31] Houghton,[32] and Aiyepeku,[33] but Cole strengthens it by development of an efficiency correlation ratio between library holdings and user needs.[34]

Whether this method could be applied to a collection designed to serve undergraduate needs is not clear. A number of problems arise which would not necessarily be encountered with a mature, stable body of researchers. Undergraduate students are an evolving, developing group whose interests and whose selection of periodical literature mature each year. On the other hand, they are a constant body of evolving students, so why could not confidence in the theory, at least, be confirmed. More important, the raw data in the present study reflects the choices only of freshmen, whereas the Undergraduate collection serves the total undergraduate body.

If the raw data base could be enlarged to reflect the citations of undergraduates over the four year span of college life, and if the citations were plotted against a consistent, defined group of periodicals over a period of years, a worthwhile study could be developed, asking the question: does the curve change from year to year, or does its shape remain basically the same? If it were found to be constant over a period of time, then it could be used in conjunction with other measures in deciding upon the cut-off point in subscriptions.

At UNC as in other academic communities, the Undergraduate Library is part of a complex of libraries and collection decisions are made in consideration of the total system. Furthermore, a selection or cut-off point is complicated by the dispersed location of journals, whereas this study centers around the collection of one of these locations.

Summary of Location of Periodicals

Tables 3 and 4 are designed to show, in summary form, the location of periodicals and the extent of their use. Table 3 summarizes the location of periodicals ranked according to frequency of use, and Table 4 describes the dispersion of citations according to location of the periodicals yielding the citations.

When read together, they reveal the extent of use of each library. The journals in extremely heavy use are all housed in the Undergraduate Library. The journals in moderate to heavy use, the 11th to 40th in rank order, are held chiefly in Wilson Library. As the citations become lighter, the locations of journals providing the citations become more widely dispersed and include more and more off-campus sources. Finally, the marginal titles yielding one citation each are to be found as often off campus as in Wilson Library. It is of particular interest that the Undergraduate Library as a source both of journals and citations shrinks rapidly in significance after the first ten journals are considered.

TABLE 3[a]

LOCATION OF PERIODICALS
(Ranked in Order of Decreasing Use)

Library	Periodicals 1st 10	11th to 40th	41st to 100th	101st to 244th	Total
Undergraduate	10	8	6	3	27
Wilson	--	21	35	50	106
Health Sciences	--	--	3	23	26
Inst. Govt	--	--	2	10	12
Miscellaneous	--	--	3	12	15
Not on Campus	--	1	11	46	58
Total	10	30	60	144	244

TABLE 4[a]

DISPERSION OF CITATIONS ACCORDING TO LOCATION OF PERIODICAL WHICH FURNISHES THE CITATION

Library	Periodicals 1st 10	11th to 40th	41st to 100th	101st to 244th	Total
Undergraduate	618	111	17	3	749
Wilson	---	236	107	50	393
Health Sciences	---	---	4	23	27
Inst. Govt	---	---	4	10	14
Miscellaneous	---	---	11	12	23
Not on Campus	---	8	25	47	80
Total	618	355	168	145	1286

[a]A journal held in more than one library on campus is attributed to only one library, in this order of priority: Undergraduate, Wilson, Health Sciences, Inst. Govt, Miscellaneous.

Journals Subject to Extremely Heavy Use

Statistics

This group of 10 journals in extremely heavy use accounts for 48.1% or nearly half the total citations. Table 5 presents a summary of their distribution and Table 6 ranks the individual titles in the order of the total number of their citations, from 31 to 125 citations per journal. This is an important concentration mathematically but may be less important if viewed from the standpoint of the

TABLE 5

THE TEN MOST HEAVILY CITED PERIODICALS
(According to Library Location)

Library	Periodicals		Citations	
	No.	Percent	No.	Percent
Undergraduate	10	4.1	618	48.1

TABLE 6

THE TEN MOST HEAVILY CITED PERIODICALS
(In Order of Frequency of Citation)

Title	Times Cited
Time	125
Newsweek	119
U. S. News	79
Life	63
Reader's Digest	49
Saturday Review	48
New Republic	38
New York Times	34
Nation	32
Look	31
Total citations	618

scholarly development of freshmen. That is to say, it cannot be assumed that the scholarly value of these periodicals is directly proportional to their frequency of citation. As expected, all are held in the Undergraduate Library and all are indexed in Reader's Guide, except the New York Times, which publishes its own index.

Comment on Titles

Eight of these periodicals may usually be found in middle class homes and were probably familiar to most of the students prior to their arrival at university. Reliance upon the familiar, together with the non-specialized nature of the assignment, may explain their heavy use by freshmen. Even the magazine Look, which ceased publication in 1971, continued to be among the most popular periodicals cited a year later by students in this study.

By contrast, the other two periodicals in this list, Nation and New Republic, are not household words. Circulation figures alone attest to this fact. The circulation of Time is 4,250,000; of Reader's Digest, 17,900,000; of Newsweek, 2,699,000; of U. S. News, 1,875,000, whereas the circulation of Nation is 30,000; of New Republic, 150,000.[35]

Yet the two periodicals, Nation and New Republic, are among the ten most heavily cited. Is credit due the high schools for introducing students to them; did freshmen discover these periodicals through the use of Reader's Guide, browsing, reference assistance or the recommendation of instructors? It is not possible to offer a conclusive explanation. Nevertheless the fact remains that periodicals of the liberal left, which do not fit into the same mould as do the other

eight, and which have relatively small circulation, still rank among the top ten in number of times cited.

Journals in Moderate to Heavy Use

Statistics

In this group there are 30 journals, cited from 6 to 21 times each. These journals warrant close attention because they are fairly heavily cited while dispersed in location. Table 7 provides a statistical summary of the distribution of these journals, indicating how many journals are held in each library and how many citations are attributed to the journals held in each library. Reference to Table 1 in conjunction with Table 7 will show that this group of journals together accounted for 355 (27.6%) of the citations.

TABLE 7[a]

THE THIRTY FAIRLY HEAVILY CITED PERIODICALS
(According to Library Location)

Library	Periodicals		Citations	
	No.	Percent	No.	Percent
Undergraduate	8	26.7	111	31.3
Wilson	21	70.0	236	66.5
Not on Campus	1	3.3	8	2.3
Total	30	100.0	355	100.0

[a]A journal held in both libraries is attributed only to the Undergraduate Library.

It will be seen that 8 journals of this group (26.7%) are held in the Undergraduate Library, while 21 (70%) are held in the Graduate Research Library - usually referred to as the Wilson Library. When

summarized according to the number of citations, it is seen that journals held in the Undergraduate Library gave rise to 111 (31.3%) of the citations of this group, while the Wilson Library journals yielded 236 (66.5%) of the citations. For the journals in moderate to heavy use, it is clear that there is heavy dependence on the Wilson Library.

Comment on Titles

Table 8 ranks the 30 periodicals of this group according to the total number of occasions upon which they were cited. Subtotals for each subgroup of 10 periodicals is displayed, together with the total number of citations for the group. The library location of each periodical is also indicated.

A number of the citations in this group come from journals for which the complete run is maintained in Wilson Library, but for which the current issue is kept in the Undergraduate Library. As noted in Table 8, these journals are: Christian Century, National Review, News & Observer (Raleigh), Commonweal, New York Times Magazine, Science News, Sports Illustrated, Durham Morning Herald, Scientific American, Playboy, New Yorker, Popular Science and Today's Education.

This would suggest that some students may have become familiar with journals new to them by browsing through current issues and pursuing back copies as needed to their source in Wilson Library. It also suggests that where students develop confidence in a journal, or are interested sufficiently in an article it contains, they are not hesitant to seek it in a location other than the Undergraduate Library.

TABLE 8[a]

THE THIRTY FAIRLY HEAVILY CITED PERIODICALS

(The Eleventh to Fortieth Periodical
in Order of Frequency of Citation)

	Times Cited	Subgroup	Library
Science	21		UL
Saturday Evening Post	19		UL
Atlantic Monthly	19		UL
Business Week	18		W
America	16		W
Christian Century	15		W (current in UL)
Science Digest	15		W
Senior Scholastic	15		W
Esquire	14		UL
National Review	14	166	W (current in UL)
News & Observer (Raleigh)	14		W (current in UL)
Commonweal	13		W (current in UL)
NY Times Magazine	13		UL
Science News	13		W (current in UL)
Sports Illustrated	12		W (current in UL)
Fortune	11		UL
Today's Health	11		W
Durham Morning Herald	11		W (current in UL)
Scientific American	10		W (current in UL)
Education Digest	9	117	W
Playboy	9		W (current in UL)
Good Housekeeping	8		Not on Campus
New Yorker	8		W (current in UL)
Congressional Record	7		W
Parent's Magazine	7		W
Popular Science	7		W (current in UL)
Harper's Magazine	7		UL
Current History	7		UL
Christianity Today	6		W
Today's Education	6	72	W (current in UL)
Total citations		355	

[a]A journal held in both libraries is attributed to the Undergraduate Library only.

Abbreviations:

UL - Undergraduate Library
W - Wilson Library

Some of the rather heavily cited journals in this category merit examination.

(a) Business Week. Although not in the Undergraduate collection, this basic general business magazine is far more heavily cited than many journals which are more readily available to freshmen. William Katz considers it to be "the business magazine for all libraries from senior high school through the university."[36]

(b) The science journals considered as a group: Science, Science News, Science Digest, Scientific American, Popular Science. The usage pattern for these periodicals suggests a considerable interest in science. Of these publications, only Science is held in the Undergraduate Library, although the current issue of the others (except Science Digest) is held there. Science combines technical articles and general essays to produce a well-received general science magazine. Science Digest, a magazine that tends to popularize science to the point of rendering it unscientific, was next in popularity to Science with 15 citations. Both Science News (a slim weekly letter which reports serious scientific news), and Scientific American, the general science publication which describes technological and scientific advances for the intelligent layman, received more citations than did Popular Science, a magazine for hobbyists. Science News received 13 citations; Scientific American, 10; Popular Science, 7 citations. (Indeed, it is surprising to find Popular Science cited at all in an argumentative research paper). If the number of citations for the science journals can be taken as a measure of interest by freshmen in science, then there may be a case for including additional scientific journals in the Undergraduate collection.

(c) Journals of public affairs published by religious organizations: America, Commonweal, Christian Century, Christianity Today. America, a worldly, sophisticated Roman Catholic weekly published by the Jesuits, received 16 citations. Commonweal, another Roman Catholic current events publication aimed at the educated liberal, received 13 citations. Christian Century, a liberal magazine directed to Protestants, yielded 15 citations. Christianity Today, a conservative magazine directed to evangelical Protestants, received 6 citations. None of these journals are in the Undergraduate; all four are in Wilson Library, with the current issue of Christian Century held in the Undergraduate Library.

It is not immediately apparent why there is such a distinct interest in Roman Catholic publications in a region where the Roman Catholic Church has almost no influence and where the evangelical and fundamentalist tradition is very strong. A possible explanation is that the readers are impressed with the articles themselves, whatever the source; another is that they may not have ascertained who the publishers are; yet another explanation is that no strong religious prejudices have arisen in the community to make readers shy away from publications issued by another religious organization. In any case, it is clear that the students in the sample manifested an interest in religious views as they bear on current events. A closer study of a selected group of religious journals, to ascertain whether or not there are any of substance which would find a receptive audience among UNC undergraduates, might be a profitable undertaking.

(d) Two local newspapers, the current issues of which are kept in the Undergraduate Library, proved to be popular. The News & Observer received 14 citations and the Durham Morning Herald, 11. A check on the citation dates revealed that there were more current than retrospective citations in one case and that they were divided equally in the other. This information is presented in Table 9. Only in Table 9 is it the case that where a student included more than one citation to a newspaper, both citations were included in the Table.

TABLE 9

CITATIONS TO TWO LOCAL NEWSPAPERS

	Retrospective	Current[a]
News & Observer (Raleigh)	6 citations	10 citations
Durham Morning Herald	6 citations	6 citations

[a]Any citation bearing a date of the spring of 1972 was considered to be current. It will be remembered that the term papers upon which this study is based were written during the spring of 1972.

It cannot be concluded, however, that the students depended either on the Undergraduate Library for the current citations, or on the Wilson Library for the retrospective ones. Many students buy their own newspapers regularly and could easily have obtained current citations from their own copies or friends' copies. Nor is it a straightforward procedure to gain access to back copy in the Wilson Library. True, the Wilson Library maintains back copy of the News & Observer on microfilm, but there is no index for it. As for the Durham Morning Herald, the Newspaper Room of Wilson Library retains back copies for one month only,

and there is no microfilm for it, although there is an index. Thus in one case there is microfilm available but no index; in the other, an index but no back copy. Nevertheless, students cited retrospective material. How? The only index to the News & Observer is maintained by the Department of Art, Culture and History, Office of State Archives and History, Raleigh, North Carolina. An inquisitive, persevering freshman could in theory track down a citation in this manner - albeit an unlikely course for him to take. A more common practice is to look up subject matter in the New York Times Index and to seek the corresponding date in the local paper. The freshman could do this easily enough for the News & Observer, but how could he do it for the Durham Morning Herald? He would have to visit the Durham offices of the newspaper or some other source off campus. It is far more likely that citations to back issues came from articles passed on by friends or instructors; from references to citations mentioned in other contexts; from articles found in a vertical subject file.

Certainly there is no pattern here to point to consistent use of an index nor of use of the Wilson or Undergraduate Library for these newspapers, although undoubtedly the current issues are widely read, both in and out of the libraries.

Journals in Light to Moderate Use

Statistics

In this category there are 60 journals, cited from 2 to 5 times each. By referring both to Table 1 and Table 10 it is possible to compare this group with the others and at the same time to study the breakdown by library location within the group. This category

TABLE 10[a]

SIXTY PERIODICALS IN LIGHT TO MODERATE USE
(According to Library Location)

Library	Periodicals No.	Periodicals Percent	Citations No.	Citations Percent
Undergraduate	6	10.0	17	10.1
Wilson	35	60.0	107	64.0
Health Sciences	3	5.0	4	3.0
Inst. Govt	2	3.3	4	2.3
Miscellaneous Lib.[b]	3	5.0	11	6.5
Not on Campus	11	18.3	25	14.9
Total	60	100.0	168	100.0

[a]A journal held in more than one library is attributed only to one library, in this order of priority: Undergraduate, Wilson, Health Sci., Inst Govt, Misc.

[b]Music, Library Science, North Carolina Collection.

accounted for 168 (13%) of the total citations. Table 10 summarizes the distribution of these lightly used journals, showing them to be widely scattered in location. A total of 8 libraries on campus and an unknown number off-campus sources would be needed to obtain these citations.

Table 10 shows the Wilson Library once again to be the source for the largest number of journals cited, in that it provided 35 (60%) of the journals in this category, which in turn furnished 107 (64%) of the citations. The off-campus sources were next in strength, accounting for 25 (14.9%) of the citations. The Undergraduate Library ranked third, accounting for 17 (10.%) of the citations.

It is not surprising to find that the relatively lower use of this group of journals is accompanied by a fanning out in location, so that they may be found in a broad group of libraries on campus, or indeed not on campus at all.

Comment on Titles

Table 11 ranks the 60 periodicals of this category in order of frequency of citation, and displays the library location. As to content, the range spreads from the scholarly to the frivolous. A closer look at some of the titles reveals a number of interesting contrasts.

(a) Daily Tar Heel, cited 4 times, is held on microfilm in the North Carolina Collection, while Vogue, also cited 4 times, is in the Undergraduate Library. While some may question the quality of Tar Heel articles, one can hardly say that Vogue is of greater intellectual worth for students than is the Tar Heel. True, three of the citations to Tar Heel were current (January to March, 1972), and the fourth did not provide a date (only a list of article names - reports on UNC football by various committees following the death of a player). Without a search through old copy it was impossible to tell whether the dates for citations in the fourth paper were current or not. Yet it is still reasonable to assume that if microfilm were retained in the Undergraduate Library, it would be used to search back copy. Having regard to the fact that it is the student's own paper, one might suggest that the logical site for microfilm is the Undergraduate Library rather than the Carolina Room.

TABLE 11[a]

SIXTY PERIODICALS IN LIGHT TO MODERATE USE
(in Order of Frequency of Citation)

Title	Times Cited	Subtotal	Library
Congressional Q Almanac	5		W
Congressional Q Wkly Rpt	5		W
Consumer Bulletin	5		W
Ebony	5		W
Charlotte Observer	5		W
Greensboro Daily News	5		W
Vital Speeches	5		W (current in UL)
Bulletin Atomic Scientists	4		W
Consumer Reports	4		W
Daily Tar Heel	4	47	NC Collection
Ladies Home Journal	4		Not on Campus
Publishers Weekly	4		W
Vogue	4		UL
Wall Street Journal	4		W
AMA Journal	3		HSci
American Scholar	3		W
Commentary	3		W (current in UL)
Economist	3		W
Harvard Educ. Review	3		W
McCall's	3	34	Not on Campus
National Geographic	3		W
Popular Mechanics	3		UL
Psychology Today	3		UL
Ramparts	3		W
Trans-Action	3		W
Facts on File	3		UL
Winston-Salem Journal	3		W
Aviation Week	2		W
Better Homes	2		Not on Campus
Changing Times	2	27	W

[a]A journal held in more than one library is attributed only to one library, in this order of priority: Undergraduate, Wilson, Health Sci., Inst. Govt, Miscellaneous.

Abbreviations:

UL - Undergraduate Library
W - Wilson Library
HSci - Health Sciences Library
IG - Institute of Government Library
Current in UL - the current issue is retained in the Undergraduate Library

TABLE 11--Continued[a]

Title	Times Cited	Subtotal	Library
Chemistry	2		Not on Campus
Child Welfare	2		IG
Children	2		HSci
Congressional Digest	2		UL
Contemporary Review	2		W
Down Beat	2		Not on Campus
Family Weekly	2		Not on Campus
Foreign Affairs	2		W
Jnl Educ. Psychology	2		W
Jnl Marriage & Family	2	20	W
Library Journal	2		LibSci
Mental Hygiene	2		HSci
Motor Trend	2		Not on Campus
National Wildlife	2		Not on Campus
Natural History	2		Not on Campus
NY Times Book Review	2		UL
PTA Magazine	2		W
Parks & Recreation	2		W
Reporter	2		Not on Campus
Rolling Stone	2	20	Music Lib
University, a Princeton Q	2		Not on Campus
Wildlife in North Carolina	2		NC Collection
School & Society	2		W
Asheville Citizen	2		W
Chapel Hill Weekly	2		W
Chicago Tribune	2		W
Raleigh Times	2		W
Sun (Durham)	2		W
Washington Post	2		W
American Education	2	20	IG
Total		168	

(b) Congressional Quarterly Weekly Report, and Congressional Quarterly Almanac, both housed in Wilson Library, were cited 5 times each, while Congressional Digest, in the Undergraduate Library, was cited twice. This may reflect an interest in direct sources and direct quotations in preference to a digest prepared by an intermediary, at least in respect of activities of Congress.

(c) of the 13 journals cited three times each, 3 are housed in the Undergraduate Library: Psychology Today, Popular Mechanics, Facts on File. One may wonder why Psychology Today is not cited more often: it is agreeable to read, has a lively flavor and handles interesting material. The probable reason is that it is not indexed. Yet if this journal is not cited often, while more obscure and erudite journals are cited, it may be taken as one indication that freshmen do in fact use some indexing tools.

Popular Mechanics is similar to Popular Science in style, content and appeal. Like Popular Science, it was probably included in the Undergraduate collection to provide relaxation, although apparently it does not provide as much relaxation as Playboy, cited 9 times while not in the Undergraduate collection at all except for the current issue. Playboy, of course, includes many thoughtful articles whereas Popular Mechanics is directed to the hobbyist and amateur motor mechanic. Probably one of these two magazines, either Popular Science or Popular Mechanics, would suffice to meet the recreational need that they offer.

Periodicals Cited Only Once[37]

This group contains the 144 periodicals cited only once. While of little practical use in collection building, this list serves to illustrate further the diversity of interests expressed by the citations. In addition, such a list might assist a weeding process, or a process of shifting a periodical from one library to another.

Statistics

Table 12 summarizes the distribution of these thinly cited journals and shows how widely scattered they are in location, in being ascribed to 10 libraries and to unknown off-campus sources. The off-campus sources furnish a substantial 31.9% of the periodicals cited and yield approximately the same number of citations as Wilson Library. The Health Sciences Library, providing 23 (16%) of the citations, has become a relatively important source of material, while the Undergraduate Library, holding only 3 periodicals, is an insignificant source of periodical articles. A comparison of Table 1 with Table 12 reveals again the extremely wide spread of periodicals from heavily used to thinly used, and shows the journals described in Table 12 to

TABLE 12[a]

PERIODICALS CITED ONLY ONCE[b]
(According to Library Location)

	Periodiclas		Citations	
	No.	Percent	No.	Percent
Undergraduate	3	2.0	3	2.0
Wilson	50	34.7	50	34.5
Health Sciences	23	16.0	23	15.9
Inst. Govt	10	7.0	1	6.9
Miscellaneous[c]	12	8.3	12	8.3
Not on Campus	46	31.9	47	32.4
Total	144	100.0	145	100.0

[a]A journal held in more than one library is attributed only to one library, in order: Undergraduate, Wilson, HSci, IG, Misc.

[b]One periodical is cited twice, but is included to keep the categories analysed in multiples of ten.

[c]Botany, CPC, Law, Math-Phys., NC Colln, Pharm/Chem.

represent 59% of all the periodicals cited, but only 11.3% of the citations.

It is noteworthy that a substantial number of students were willing to go not only to Wilson Library but to many other libraries on campus in search of information. There is no way of being certain that the libraries on campus were the actual libraries visited, but it is a reasonable conjecture that most, if not all the journals available on campus were obtained from campus sources.

The extensive use of off-campus sources cannot be ignored, and the surprisingly heavy reliance on these sources attests to the infinite variety of human interests which can never be met in one institution.

Comment on Titles

Table 13 lists the 144 periodicals which were cited only once. Newspapers are kept together as a subgroup at the end of the list. This list of marginal titles includes a large number of local newspapers, a few national newspapers and some international periodicals. It also reflects the interests of a number of students in legal and health problems.

(a) Journals not on campus: of the significant number not on campus, some are for relaxation, like Better Homes, Ladies Home Journal; some are in-house organs, like This Week Magazine and Industry Week; others may be found in nearby Duke University or NC State University; still others appeal to small, homogeneous groups. (Vector, a magazine for homosexuals, is one of these).

TABLE 13[a]

PERIODICALS CITED ONLY ONCE[b]
(Showing Library Location)

Title	Times Cited	Library
Winston-Salem Jnl Sentinel	2	Not on Campus
Amer. Academy Pol. Sci. Annals	1	UL
Amer. Bar Association Journal	1	IG
Amer. Behavioral Scientist	1	IG
Amer. Economic Review	1	W
Amer. Heritage	1	UL
Amer. Jnl Diseases of Children	1	HSci
Amer. Jnl Mental Deficiency	1	HSci
Amer. Jnl of Nursing	1	HSci
Amer. Journal of Psychiatry	1	HSci
Amer. Legion Magazine	1	W
Amer. Political Science Review	1	W
Amer. School Board Journal	1	IG
Archives of Internal Medicine	1	HSci
Athletic Journal	1	W
Audubon	1	Bot/Zoo
Boston After Dark	1	Not on Campus
Broadcast Engineering	1	Not on Campus
Business World	1	Not on Campus
Catholic Digest	1	Not on Campus
Catholic World	1	W
Chemical and Engineering News	1	Chem/Pharm
Circus	1	Not on Campus
City Almanac	1	Not on Campus
Current Magazine	1	Not on Campus
Dairy Council Digest	1	HSci
Dance Magazine	1	Not on Campus
Dental Clinics of North America	1	HSci
Dental Management	1	HSci
Enquirer	1	Not on Campus

[a]A journal held in more than one library is attributed only to one library, in order of priority: Undergraduate, Wilson, HSci, IG, Miscellaneous.

[b]One periodical is cited twice but is included to keep the categories in multiples of ten.

Abbreviations:

UL - Undergraduate Library
W - Wilson Library
HSci - Health Sciences Library
IG - Institute of Government Library

TABLE 13--Continued[a]

Title	Times Cited	Library
Dissertation Abstracts	1	W
Dun's Review	1	W
Editorial Research Reports	1	W
E. M. Kennedy Quarterly	1	Not on Campus
Ethics	1	W
Family Planning Perspective	1	CPC
Fusion	1	Not on Campus
Golf Digest	1	Not on Campus
Holiday	1	W
Home Garden	1	Bot
Horizon	1	UL
Horticulture	1	Bot
Illinois Bar Journal	1	IG/Law
Industry Week	1	Not on Campus
Indian Opinion	1	Not on Campus (ceased pub)
Inventory	1	HSci
Jnl of Abnormal Psychology	1	W
Jnl Acoustical Society of America	1	Not on Campus
Jnl of College Radio	1	Not on Campus
Jnl Educational Research	1	W
Jnl of Experimental Education	1	W
Jnl of Higher Education	1	W
Jnl Nutrition Education	1	HSci
Jnl of Parapsychology	1	NC Colln
Jnl of Psycho-Asthenics	1	Not on Campus
Jnl Public Health Dentistry	1	HSci
Jnl Religion and Health	1	HSci
Jnl School Health	1	HSci
Jnl Social Issues	1	IG/CPC
Judicature	1	Not on Campus
Karate Illustrated	1	Not on Campus
Kentucky Law Journal	1	IG/Law
Kenyon Review	1	W
Laryngoscope	1	HSci
Liberation: an Indep Monthly	1	W
Living Wilderness	1	W
Lutheran Social Welfare Q	1	W
Mademoiselle	1	Not on Campus
Mechanix Illustrated	1	Not on Campus
Medical Journal of Australia	1	HSci

TABLE 13--Continued[a]

Title	Times Cited	Library
Mensa Bulletin	1	Not on Campus
Mental Retardation	1	HSci
Minnesota Medicine	1	HSci
Missionary Review	1	W
Modern Fiction Studies	1	W
Nations Schools	1	IG
National Catholic Reporter	1	Not on Campus
National Civic Review	1	IG
National Genealogical Soc Q	1	W
National Parks Magazine	1	W
National Republic	1	W
Nature	1	HSci
New England Quarterly	1	W
New Schools Exch Newsletter	1	Not on Campus
New Statesman	1	W
Nursing Outlook	1	HSci
Nursing Research	1	HSci
Nutrition	1	Not on Campus
Nutrition News	1	HSci
PMLA	1	W
The Plain Truth: Mag of Understdg	1	W
Planet	1	Not on Campus
Police Chief	1	IG
Population Index	1	W
Prophetic News Letter	1	Not on Campus
Public Opinion Quarterly	1	W
Redbook Magazine	1	Not on Campus
Research News	1	Not on Campus
Rocky Mountain Medical Journal	1	HSci
Royal Soc. Medicine. Proceedings	1	HSci
Salt: Army Educl Jnl	1	W
Scientific Monthly	1	W
Seventeen	1	Not on Campus
Shakespeare Quarterly	1	W
Sky and Telescope	1	Math-Physics
Social Casework	1	W
Social Work	1	W
Social Work Practice	1	W
Society of Film and TV Arts	1	W
Sporting News	1	Not on Campus

TABLE 13--Continued[a]

Title	Times Cited	Library
Southern Economic Journal	1	W
Stanford Alumni Almanac	1	Not on Campus
Sunset	1	W
This Week Magazine	1	Not on Campus
Transportation Journal	1	W
UCLA Law Review	1	Law
UNESCO Courier	1	W
United Nations Monthly Chronicle	1	W
US Catholic	1	Not on Campus
US Catholic and Jubilee	1	Not on Campus
US Dept. State Bulletin	1	W
Univ. North Carolina Magazine	1	NC Colln
Vector	1	Not on Campus
Virginia Law Review	1	Law
Weekly Compilation Pres. Doc.	1	W
Wilson Library Bulletin	1	W
Wisconsin Law Review	1	IG
World Politics	1	W
Worldwide Impact	1	Not on Campus
Yale Law Journal	1	Law
Chapel Hill News Leader	1	NC Colln
Chicago Daily News	1	Not on Campus
Christian Science Monitor	1	W
Daily Orange	1	Not on Campus
Gastonia Gazette	1	Not on Campus
Monterey Peninsula Herald	1	Not on Campus
National Observer	1	W
National Police Gazette	1	Not on Campus
National Underwriter	1	W
Pottstown Mercury	1	Not on Campus
Syracuse New Times	1	Not on Campus
Times (London)	1	W
Urban Crisis Monitor	1	Not on Campus
Wilmington Morning Star	1	Not on Campus
Total	144	

(b) The three journals held in the Undergraduate Library are American Academy of Political Science. Annals; American Heritage; Horizon. It is entirely possible that these journals are used in other assignments or for other courses but on this occasion they were cited once only, while others, less accessible to freshmen, were more heavily used.

The First Fifty Periodicals

Table 14 shows a detailed breakdown of distribution, by library location, of citations furnished by the first fifty periodicals. For each library it displays the number of citations yielded by each succeeding group of periodicals in the heavy and moderate range of use. Figure 4, derived from Table 14, illustrates graphically the sharp rise in the use of Wilson, and the sharp drop in the use of the Undergraduate Library, at a critical point.

TABLE 14[a]

CITATIONS ORIGINATING IN EACH LIBRARY
YIELDED BY THE FIRST FIFTY PERIODICALS
(Ranked in Order of Decreasing Frequency of Citation)

	Periodicals					
Library	1st 10	11th to 20th	21st to 30th	31st to 40th	41st to 50th	Total
Undergraduate	618	73	24	14	---	729
Wilson	---	93	93	50	43	279
Not on Campus	---	--	--	8	4	12
Total Citns	618	166	117	72	47	1020

[a]Periodicals held in both libraries are attributed only to the Undergraduate Library.

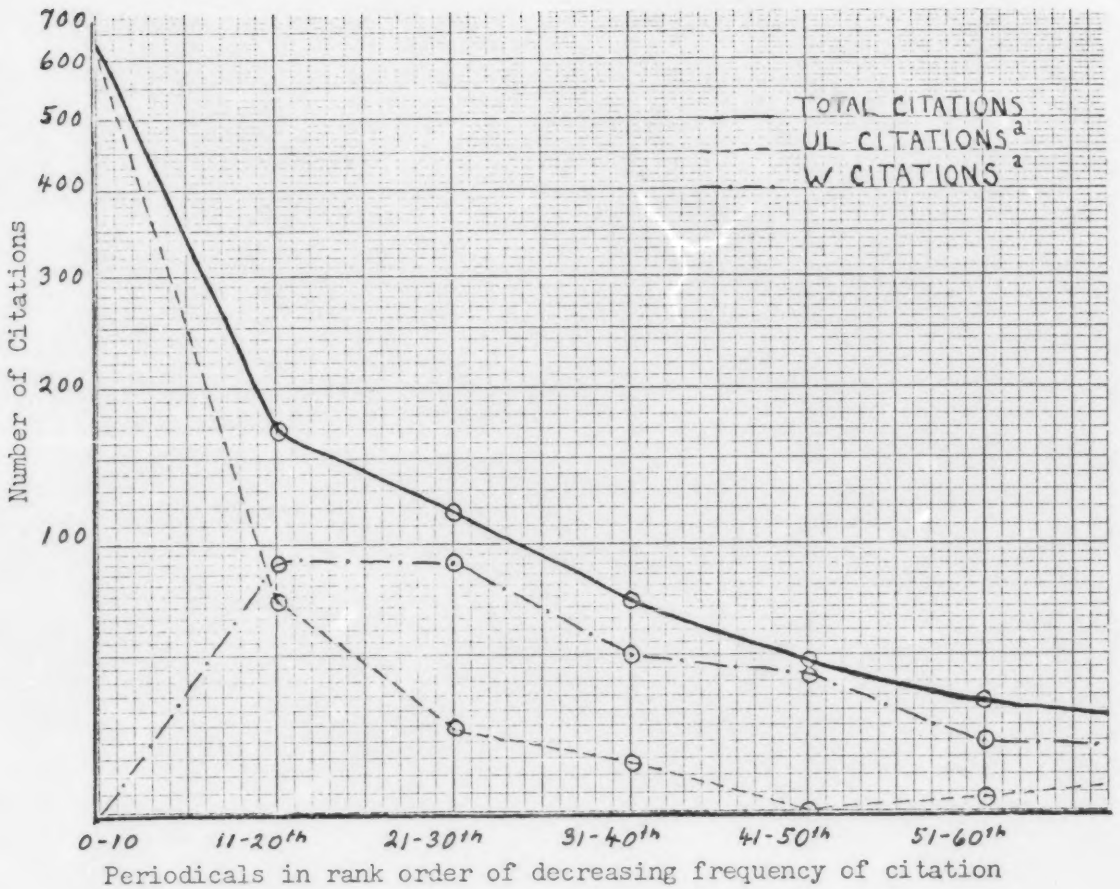

Figure 4.--Number of citations originating in each library, yielded by the first fifty periodicals

Notes: a) A periodical held in both libraries is attributed only to the Undergraduate Library.

b) Graph is plotted on semi-log paper.

c) Data are plotted every 10th point.

In the range of moderately cited journals, the point of interest is that the gradual overall decrease in the number of citations per journal is not paralleled by a gradual decrease in the use of the Undergraduate Library, but by a sudden, sharp decrease in its use, and a sudden increase in the use of Wilson Library; after that point the pattern of location for the moderately used journals is erratic. In practice this means that some journals used scarcely at all are in the Undergraduate Library, while others used fairly heavily are in Wilson Library. There is not, then, a gradual fanning out from an Undergraduate Library location to other locations in proportion to the decline in frequency of citation.

Summary

This chapter has sought to provide insight into the pattern of periodicals use by freshmen under the conditions described, and to relate this to library location of materials. Further, it has examined specific titles in relation to their accessibility in the Undergraduate Library. The findings are these:

1. There is extremely concentrated use of only a few titles and scattered use of the greatest portion of titles - a phenomenon that occurs repeatedly in citation distribution as in other activity. The curve describing such distribution, known as the Yule curve, was observed in this study.

2. The location of periodicals is summarized thus:

(a) The few periodicals receiving the bulk of the citations are housed in the Undergraduate Library.

(b) The pattern of location for journals in moderate to heavy use is erratic. Although these journals are housed for the most part in the Wilson Library, a number are in the Undergraduate Library, with no discernible pattern of prediction. Generally, the Wilson Library emerges as the main resource center drawn on for the scholarly journals, while the Undergraduate Library is relied upon as the basic source for the familiar, popular materials.

(c) Most of the marginal titles (cited once only) are not in campus libraries. This is probably because these materials are of an ephemeral nature, of interest to a small minority, or purely local in character.

CHAPTER 4

A SURVEY OF INDEXES WHICH MAY HAVE BEEN DRAWN ON FOR CITATIONS

The purpose of the investigation of indexing was three-fold: (1) To provide an overview of the range of indexes that could have been used as access points to the citations (2) To establish the use that may have been made of the various indexes (3) To find out to what degree the Undergraduate Library could have provided bibliographic access to the citations.

A note of caution is introduced once again. The raw data for this study is drawn entirely from bibliographic citations and from records. There was no personal contact with citing students. Thus it cannot be stated conclusively that students did actually exploit the indexes as aids to citation, or that they used them in the full measure possible. Nevertheless, it is generally recognized that freshmen make heavy use of Reader's Guide, at least, and the findings of this study appear to confirm this contention. In any case, for all indexes except Reader's Guide, their possible use at best is rather small, so that findings will not be distorted by their inclusion in the survey.

Overview

Table 15 presents an overview of the possible indexes students could have used, showing what percentage of citations could arise from each index. Figure 5 displays in graphic form the data presented statistically in Table 15. A glance at Figure 5 shows that Reader's Guide was used almost to the exclusion of every other index, and that a surprisingly large number of periodicals used were not indexed at all.

TABLE 15[a]

INDEXES IN WHICH CITATIONS COULD BE FOUND

(A Summary of Use Made of Each Index)[b]

	Periodicals		Citations	
	No.	Percent	No.	Percent
Reader's Guide	84	34.4	1001	77.8
SSHI	15	6.1	19	1.5
PAIS	19	7.8	28	2.2
Education Index	10	4.1	12	.9
Psych Abstracts	8	3.3	8	.6
Index Medicus	8	3.3	10	.8
Misc. indexes	26	10.7	86	6.7
Not indexed	74	30.3	122	9.5
Total	244	100.0	1286	100.0

[a]Periodicals are shown as being indexed only once, in this order of priority: Reader's Guide, SSHI, PAIS, Ed. Index, Psych Abstracts, Index Medicus, Miscellaneous.

[b]It cannot be stated conclusively that students used these indexes. This is a survey of bibliographic access rather than a definitive study of actual usage.

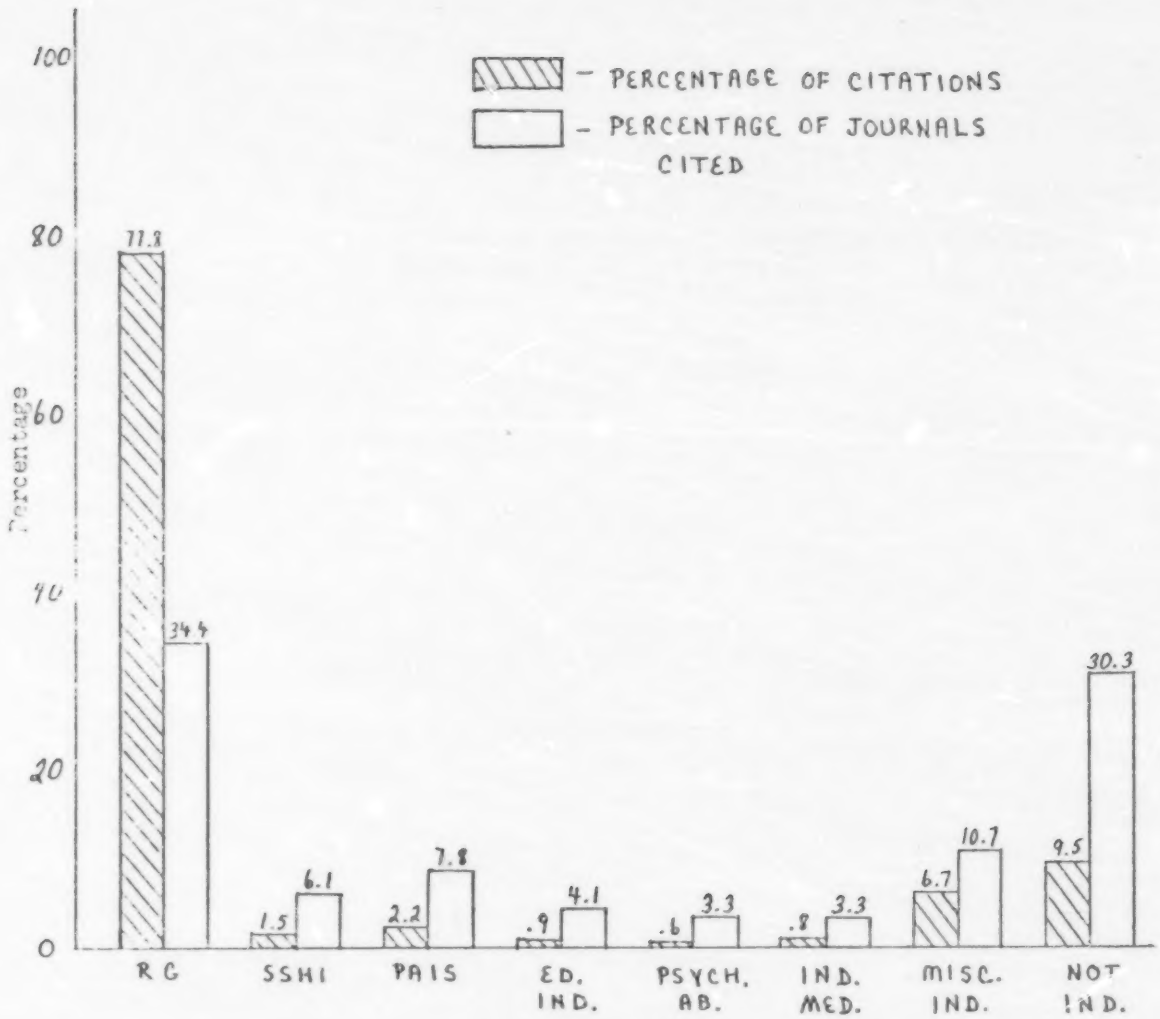

Figure 5.--Indexes in which citations could be found.[a]

[a]Periodicals are shown as being indexed only once, in this order or priority: Reader's Guide, SSHI, PAIS, Ed. Index, Psych Abstracts, Index Medicus, Miscellaneous.

Reader's Guide

Table 15 has shown that 84 (34.4%) of the periodicals indexed in Reader's Guide furnish a significant 1001 (77.8%) of the total citations. Since the extensive use of Reader's Guide is clearly established, it becomes of paramount interest to know in which libraries the cited journals are held. Table 16 displays this information. On first inspection, a reading of Table 16 seems to suggest a heavy reliance upon the Undergraduate Library, in that 707 (70.7%) of the citations accessible through Reader's Guide are furnished by periodicals in the Undergraduate collection. A hasty

TABLE 16[a]

PERIODICALS INDEXED IN READER'S GUIDE
(Summary of Location)

	Periodicals		Citations	
	No.	Percent	No.	Percent
Undergraduate	23	27.4	707	70.7
Wilson	44	52.4	260	26.0
Health Sciences	1	1.2	2	.2
Misc. Libraries[b]	4	6.9	4	.4
Not on Campus	12	14.3	28	2.8
Total	84	100.0	1001	100.0

[a]Periodicals and indexes available in more than one library are attributed only to one library, in this order of priority: Undergraduate, Wilson, HSci, Misc.

[b]Botany, Math-Physics.

conclusion must not be reached, however. Apart from the fact that Reader's Guide itself is available both in Wilson and the Undergraduate

Libraries, and that many of the periodicals attributed to the Undergraduate Library are in both libraries, there is another consideration. It will be recalled that 9 out of 10 of the most popular periodicals are indexed in Reader's Guide. Of the 707 citations already alluded to, 584 arise from these popular magazines. If these are set aside, then the 123 citations arising from the other periodicals in the Undergraduate collection may be compared appropriately with the 260 citations yielded by periodicals in the Wilson Library, and the 14 remaining periodicals in the Undergraduate collection with the 44 periodicals in the Wilson collection. Thus, apart from the popular ten, the Wilson Library accounted for over twice the citations, and over three times the number of periodicals accounted for by the Undergraduate Library.

The 12 magazines not subscribed to at UNC are designed for relaxation rather than for support in research. Their inclusion in bibliographies suggests that many freshmen are still learning to write argumentative research papers and have yet to mature.

Specific titles of periodicals indexed in Reader's Guide are listed in Table 17, together with the number of citations attributed to each periodical.

A conclusion with respect to use of Reader's Guide is this: students appear to have confidence in Reader's Guide, and are perfectly willing to move physically from library to library to track down a citation in it, but are far less willing to move intellectually from Reader's Guide to other indexes.

TABLE 17

PERIODICALS INDEXED IN READER'S GUIDE[a]

SHOWING NUMBER OF TIMES CITED

(Arranged in Alphabetical Order)

Title	LIBRARY[b] UL	W	Misc.	Not/Campus
America		16		
Amer Acad Pol Sci. Annals	1			
American Heritage	1			
American Scholar		3		
Atlantic Monthly	19			
Audubon			1 (Bot)	
Aviation Week		2		
Better Homes				2
Bulletin of Atomic Scientists				
Business Week		18		
Catholic World		1		
Changing Times		2		
Chemistry				2
Christian Century		15		
Christianity Today		6		
Commentary		3		
Commonweal		13		
Congressional Digest	2			
Consumer Bulletin		5		
Consumer Reports		4		
Current History	7			
Dance Magazine				1
Dun's Review		1		
Ebony		5		
Educational Digest		9		
Esquire	14			
Foreign Affairs		2		
Fortune	11			
Good Housekeeping				8
Harper's Magazine	7			
Holiday		1		
Home Garden			1 (Bot)	
Horizon	1			
Horticulture			1 (Bot)	
Ladies Home Journal				4
Library Journal			2 (LibSci)	

[a]Periodicals may be indexed in additional indexes.

[b]Periodicals held in more than one library are attributed to only one, in this order: Undergraduate, Wilson, Misc.

Abbreviations: UL - Undergraduate; W - Wilson.

TABLE 17--Continued

	LIBRARY[b]			
	UL	W	Misc.	Not/Campus
Life	63			
Living Wilderness		1		
Look	31			
Mademoiselle				1
McCalls				3
Mechanix Illustrated				1
Mental Hygiene			2 (HSci)	
Motor Trend				2
Nation	32			
National Geographic Mag		3		
National Parks Mag		1		
National Review		14		
National Wildlife				2
Natural History		2		
New Republic	38			
NY Times Magazine	13			
New Yorker		8		
Newsweek	110			
PTA Magazine		2		
Parents Magazine		7		
Popular Mechanics	3			
Popular Science		7		
Publishers Weekly		4		
Ramparts		4		
Readers Digest	49			
Redbook Magazine				1
Saturday Evening Post	10			
Saturday Review	48			
School and Society		2		
Science	21			
Science Digest		15		
Science News		13		
Scientific American		10		
Senior Scholastic		15		
Seventeen				1
Sky & Telescope			1 (Math-Ph)	
Sports Illustrated		12		
Sunset		1		
Time	125			
Todays Education		6		
Todays Health		11		
Trans-Action		3		
UNESCO Courier		1		
UN Monthly Chronicle		1		
US News & World Report	79			
Vital Speeches		5		
Vogue	4			
Wilson Library Bulletin		1		

Non-Indexed Journals

Journals Not Indexed: Local Newspapers

The substantial number of non-indexed journals may be explained in part by the many citations to local newspapers, for which there are no published indexes, although some newspapers may have built up their own files to back copies. These newspapers are presented in Table 18.

TABLE 18

NEWSPAPERS OF PURELY LOCAL INTEREST
(Cited but not Indexed)

	Library		
	Wilson	NC Colln	Not/Campus
Asheville Citizen	2		
Chapel Hill News Leader		1	
Chapel Hill Weekly	2		
Charlotte Observer	5		
Chicago Daily News			1
Daily Orange			1
Daily Tar Heel		4	
Durham Sun			2
Gastonia Gazette			1
Greensboro Daily News	5		
Pottstown Mercury			1
Monterey Peninsula Herald			1
News & Observer	14		
Raleigh Times	2		
Wilmington Morning Star			1
Winston-Salem Journal	3		
Winston-Salem Jnl Sentinel			2
Syracuse New Times	—	—	1
Total Citations	33	5	11

Of the 49 citations generated by the 18 newspapers listed, three quarters could be obtained from newspapers held in a campus library. The others were probably found in the "home-town" newspapers of students. It is reasonable to infer that many freshmen retain an interest in the

newspaper of their home town and read it when available. The most popular of this group, notwithstanding the absence of an index, is News & Observer.

Other Non-Indexed Journals

A potpourri of journals comprise this group of 58 journals accounting for 83 citations. The vast majority of these are cited only once, and cover a wide variety of material. They include in-house organs, journals directed to a unique readership and journals which have ceased publication. A few stand out because cited more often than the others:

(a) Playboy - cited 9 times, has that certain appeal by which it overcomes its handicap of not being indexed.

(b) Psychology Today - cited 3 times; it is surely just a matter of time before this colorful magazine will be indexed.

Miscellaneous Indexes

This category ranked third because it is swollen by a large number of journals cited only once and by a number of national newspapers which either maintain their own indexes or are included Newspaper Index. Table 19 displays the national newspapers, together with the Durham Morning Herald, which also has its own index. It is noteworthy that the New York Times, with 34 citations, is the only national newspaper to receive more than 4 citations.

When Table 19 is compared to Table 15, it will be noted that the New York Times, which publishes its own index, was the single most important publication included with "Miscellaneous indexes" in that it accounted for nearly 40% of the citations of this category.

TABLE 19

NATIONAL NEWSPAPERS[a]
(Indexed and Cited)

	Library[c]	
	UL	Wilson
Chicago Tribune		2
Christian Science Monitor		1
Durham Morning Herald		11 (one month only)
National Observer		1
New York Times[b]	34	
The Times (London)		1
Wall Street Journal		4
Washington Post	—	2
Total Citations	34	22

[a]One local newspaper, the Durham Morning Herald, is included because it is indexed.

[b]If the citations to the New York Times Magazine are included, there are 47 citations to the New York Times instead of 34. It is possible that there was carelessness in the citations of some students, resulting in inaccurate citations either to the daily paper or to the Sunday Magazine. These citations were not verified as to source, although in a number of the papers, it is recalled, both were cited.

[c]The New York Times is held in both libraries but is attributed to the Undergraduate Library.

Abbreviations: UL - Undergraduate.

Social Science and Humanities Index

With reference again to Figure 5, it is noted that the use of SSHI was sparse. Fifteen journals were cited a total of 19 times. These journals are listed in Table 20, together with their location in one of two libraries.

TABLE 20

PERIODICALS INDEXED IN SOCIAL SCIENCE AND HUMANITIES INDEX[a]

(Summary of Location)

	No. Citations and Location[b]	
	Wilson	Inst Govt
Amer Behavioral Scientist		1
Amer Economic Review	1	
Amer Political Science Review	1	
Contemporary Review	2	
Economist	3	
Ethics	1	
Jnl Marriage and the Family	2	
Journal of Social Issues		1
New Statesman	1	
PMLA	1	
Public Opinion Quarterly	1	
Shakespeare Quarterly	1	
Social Casework	1	
Southern Economic Journal	1	
World Politics	1	-
Total Citations	17	2

[a]Many periodicals are indexed in more than one index.

[b]Periodicals held in both libraries are attributed to the Wilson Library.

The Undergraduate Library receives the current issue of 14 journals indexed in SSHI. To permit comparison with the periodicals actually cited in this study, these 14 journals are listed in Table 21. Only one journal is found to overlap Table 20 and 21: American Political Science Review. None of the other citations to periodicals indexed in SSHI arose from journals for which the current issue is received in the Undergraduate Library.

A comparison of these two lists reveals that the cited journals tend to deal with interpersonal relationships or with smaller-scale issues, while the journals held in the Undergraduate Library tend to

TABLE 21

PERIODICALS INDEXED IN SOCIAL SCIENCE AND HUMANITIES INDEX

(Whose Current Issue is Held in the Undergraduate Library)

Title
American Anthropology
American Political Science Review
American Sociological Review
Atlas
Daedalus
ELH
History Today
Journal of Modern History
Journal of Negro History
Paris Review
Problems of Communism
South Atlantic Quarterly
Social Forces
Times Literary Supplement

deal with the broad sweep of events on an impersonal scale.

How can the near absence of citations to journals indexed in SSHI be explained? One possible answer is that the Undergraduate Library, while receiving the Index itself, does not subscribe to any of the journals indexed therein. A more plausible explanation is that the freshmen on the whole felt themselves unready to consider impersonally the profusion of social, economic and political issues dealt with. While many of the term papers struggled with intellectual controversies, or with social, health and environmental problems, most were at the same time closely related to the students' own personal experiences, whether physical or intellectual. At other times, in other places, students have taken up issues with wider, more complex implications, but before this can happen, the conditions must be there to force an earlier maturity. A third explanation is that the students felt it

unnecessary to venture beyond the limits of the known, because the Reader's Guide gave them all the citations they needed for the task at hand: additional information would be superfluous for them, and too much to incorporate into the argument.

The Undergraduate Collection and Social Science and Humanities Index

The list of journals cited in this study (and indexed in SSHI) is too small, and the frequency of citations too inconclusive to support firm recommendations, but it is apparent that there is room for improvement in the choice of current issues received in the Undergraduate Library. Presumably the current issues of journals listed in Table 21 are expected to display the kind of title indexed in SSHI, and expected to encourage student interest in this index. A careful pruning and re-working of this list might reap profitable results.

Public Affairs and Information Service

This index, too, received scant use, generating 28 citations attributed to 19 journals. Most of the journals in this group are indexed in other publications as well, and for this reason the results must be interpreted with extreme caution. One strong factor supporting the use of PAIS rather than another index containing the citations is its presence in the Undergraduate Library, within elbow's reach of the Reference desk. The journals cited, together with their location and frequency of use, are presented in Table 22. In sum, this index is used only to a limited degree, with one title making a modest showing: Congressional Quarterly Weekly Report. Most of the other titles are cited once only, reflecting the work of individual students rather than a general use of PAIS.

TABLE 22

PERIODICALS INDEXED IN PUBLIC AFFAIRS AND INFORMATION INDEX[a]

(Summary of Location)

	No. Citations and Location[b]		
	Wilson	Inst Govt	Other
Amer Bar Association Jnl		1	
Amer Education		2	
Amer Journal of Nursing			1 (HSci)
Child Welfare		2	
Congr Q Weekly Report	5		
Editorial Research Reports	1		
Harvard Educ Review	3		
Judicature			1 (Not/Campus)
Kentucky Law Journal		1	
Liberation	1		
National Civic Review		1	
New England Quarterly	1		
Parks and Recreation	2		
Population Index	1		
Social Work	1		
Transportation Journal	1		
Virginia Law Review			1 (Law)
Yale Law Review			1 (Law)
Wisconsin Law Review	—	1	-
Total Citations	16	8	4

[a]Many periodicals are indexed in more than one index.

[b]Periodicals held in more than one library are attributed only to one library, in this order: Wilson, Institute of Government, Other.

Education Index, Psychological Abstracts, Index Medicus

The findings confirm the expectation that these indexes, if used at all, were used in small measure, although Education Index appears to have an edge over the other two. It may be found both in Wilson Library and in the Health Sciences Library, but not in the Undergraduate Library.

Bibliographic Access in the Undergraduate Library

One purpose of this study was to determine what degree of bibliographic access to citations could have been provided by the Undergraduate Library. With this in mind, Table 23 and Figure 6 were designed to contrast the Undergraduate Library position with that of other libraries on campus, by lumping together all the indexes held in the Undergraduate Library and comparing the citations which could have been discovered through their use, with the citations which must have been accessed through other sources.

The indexes available in the Undergraduate Library are Reader's Guide, SSHI, PAIS, New York Times Index and Book Review Digest. It must be borne in mind, however, that these indexes are also available in the Wilson Library and in some other locations on campus. Students could very well have used them in another library. Thus the most generous interpretation is being placed upon possible use of the Undergraduate Library. Universal availability notwithstanding, it is generally presumed that freshmen use the Undergraduate Library as a first stopping place and as a source of bibliographic access to citations. Time and experience leads them to greater flexibility in this respect but there is no evidence to suggest that they do otherwise than to depend heavily on the Undergraduate Library for bibliographic access in the early stages of campus life. The contention is, then, that most students used the indexes in the Undergraduate Library most of the time, even though they could have found these indexes elsewhere.

Table 23 shows that just under half (121, or 49.6%) of the journals cited may be accessed through indexes in the Undergraduate Library, and

TABLE 23

INDEXING SOURCE FOR PERIODICALS AND CITATIONS[a]

(According to Location of Indexes)[b]

Location of Index	Periodicals No.	Periodicals Percent	Citations No.	Citations Percent
Undergraduate Lib	121	49.6	1087	84.5
Other Libraries	49	20.1	77	6.0
Not Indexed	74	30.3	122	9.5
Total	244	100.0	1286	100.0

[a]Periodicals held both in the Undergraduate and another campus library are attributed only to the Undergraduate Library.

[b]An index available both in the Undergraduate and another campus library is attributed only to the Undergraduate Library. It should also be borne in mind that periodicals indexed in more than one index attributed only to one index, in this order: RG, SSHI, PAIS, Ed. Index, PA, Ind. Med., Misc.

that 1087 (84.5%) of the citations themselves could be accessed in this way. A small number of journals (47, or 19.3%) would be accessed through indexes in other libraries, and these furnish an even smaller proportion (77, or 6.0%) of the citations. The final group of 74 journals (30.3%) which were not indexed at all, generated 122 (9.5%) of the citations. This information has also been displayed in Figure 6.

It is immediately apparent that the vast bulk of the citations may be accessed through indexes held in the Undergraduate Library. It is equally apparent that a substantial number of citations originated in sources other than indexes: local newspapers, in-house organs, bibliographic citations to articles found in other works; information garnered from friends, accidental discovery, browsing. There remains

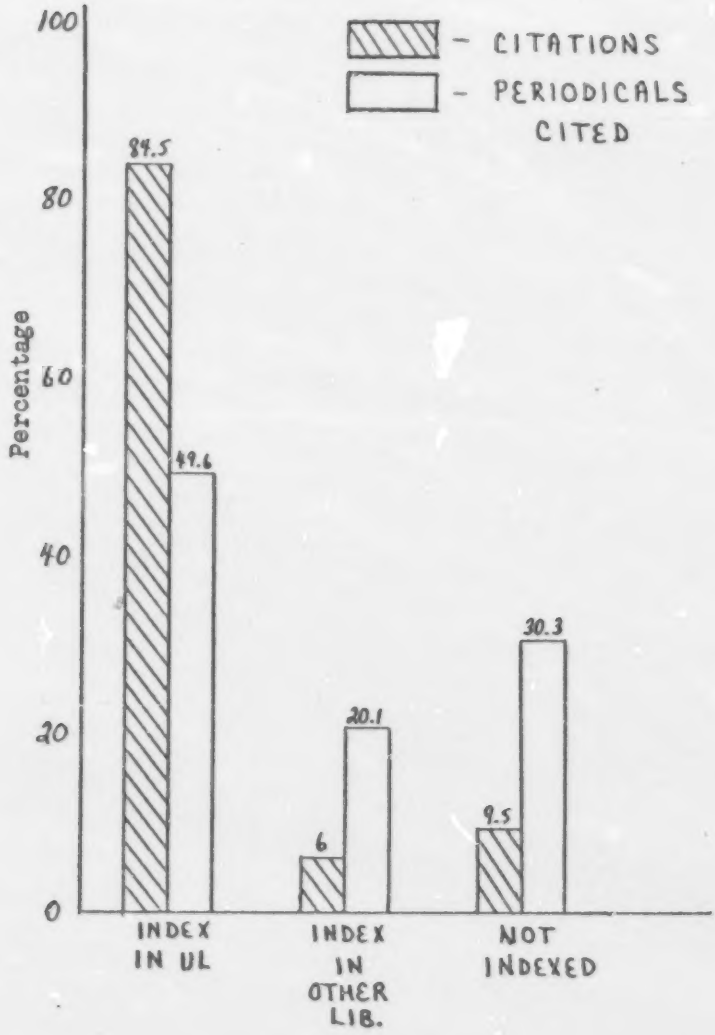

Figure 6.--Indexing source for periodicals and citations, showing the degree of access to indexing in the Undergraduate Library compared to other campus libraries

Notes: a) Periodicals and indexes held both in the Undergraduate Library and another campus library are attributed only to the Undergraduate Library.

b) Periodicals indexed in more than one index are attributed only to one index, in this order: RG, SSHI, PAIS, Ed. Index, PA, Ind. Med., Misc.

only a small proportion of the citations which originated in indexes located outside the Undergraduate Library.

If the non-indexed works are set aside, and the question is approached from the point of view of total citations, it is seen that the Undergraduate Library can provide virtually of the indexing needs of the citing freshmen. If approached from the view of the variety of journals used, it can still be safely stated that the Undergraduate Library provides a substantial 70% of their indexing needs. The other 30% is provided through a variety of indexes found chiefly, although not completely, in Wilson Library.

It can be stated with considerable confidence that when indexes are used, there is heavy dependence by freshmen on the indexing resources of the Undergraduate Library, and on Reader's Guide and New York Times Index in particular.

The question may then be asked whether dependence by freshmen on the Undergraduate Library in the matter of indexes may not be exploited by the Undergraduate Library. As the Pied Piper led the innocents to an unknown destination far more exciting than any they had ever known, so might the Librarian lead freshmen to unknown indexes, far more exciting than Reader's Guide. Alas, it requires a tune quite as fetching as the one played by the Pied Piper, and never has one been found to match it.

Summary

That freshmen turn, en masse, to Reader's Guide, is conclusively supported by the evidence. Use of all other indexes, except the New York Times Index, appears to be scant.

The generous number of citations to titles which are not indexed reinforces the view that many avenues of approach to information are utilized, of which indexing is only one.

In general, the indexing needs of students appear to be met in sources provided in the Undergraduate Library, although Education Index would probably receive more use than it does presently, were it available in the Undergraduate Library.

The presence of Reader's Guide in the Undergraduate Library does not extend to the periodicals indexed in Reader's Guide, and cited. The top ten periodicals aside, citations to articles indexed in Reader's Guide are to be found more often than not in periodicals located in the Wilson Library.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

This research has sought to provide deeper knowledge of freshman use of periodicals by a citation analysis of periodicals cited in bibliographies of required term papers. The investigation goes beyond the traditional citation analysis to explore the library location of periodicals cited and their indexing sources.

Conclusions

The conclusions arrived at are these:

1. In the matter of dispersion of citations, concentrated use of a few journals and scattered use of a wide group of periodicals, is confirmed. The dispersion of citations among the journals describes a parabola which conforms faithfully to the Yule distribution curve - that curve which describes dispersion of data where wide choice is possible among a finite number of possibilities.

2. With respect to location of periodicals, the expectation that the majority of periodicals cited would form part of the Undergraduate collection was not confirmed but rather spectacularly denied. The majority of periodicals cited are part of the Wilson collection. The citations themselves were made in the vast majority to periodicals held in the Undergraduate Library, but the bulk of these citations were to a very few popular periodicals.

At least for purposes of the English 2 term paper, freshmen turned

not to the Undergraduate Library but to Wilson Library, for all but nine or ten familiar, popular magazines in mass circulation. It appeared to be Wilson Library, not the Undergraduate Library, that provided the resource material for serious needs and specific investigations.

3. With respect to indexing of periodicals cited, Reader's Guide is confirmed as the most heavily used index; the use of other indexes, except for New York Times Index, is negligible. There was apparently no hesitation in moving from library to library to seek periodicals, but great reluctance to investigate other indexes. A significant number of periodicals cited were not indexed at all - a fact that is not as surprising as it might appear, because dependence upon informal sources of information has often been noted as a characteristic even of the most advanced researchers.

4. A surprising number of local newspapers were cited, coupled with the near absence of citations to most national newspapers.

5. The conspicuous lack of computer programs tailored to the needs of a study of this nature was noted and investigated. The findings corroborated a growing realization among librarians that research in the social sciences is far more developed than in library science.

Recommendations

Further Research Suggested

If a curve of distribution for periodical literature serving undergraduate needs at UNC could be established with confidence, the knowledge gained thereby could be turned to practical advantage, for example, in the establishment of a cut-off point for subscriptions to

periodicals. Research done to strengthen confidence in the observed curve of distribution could thus have far-reaching practical results. Two lines of investigation are suggested:

(1) Replication of the present study, three years hence, the results of which could serve to confirm or modify the present distribution pattern.

(2) A similar study with an enlarged data base to encompass the citations of undergraduates in all four years of college life. If the curve of distribution were found to be constant over a period of time, when plotted against a defined group of periodicals, conclusions reached in the more limited study could be strengthened and the practical applications extended.

Specific recommendations with respect to the Undergraduate collection

1. Business Week should be subscribed to.
2. Additional science journals should be included in the collection.
3. Journals on public affairs published by religious organizations should be re-examined with a view to including additional ones in the Undergraduate collection.
4. The complete run of Daily Tar Heel should be maintained in the Undergraduate Library on microfilm.
5. Drop Popular Mechanics from the collection. The recreational need it serves is being met by Popular Science. Both may not be needed.
6. Re-examine the use of American Heritage, American Academy of Political Science. Annals, and Horizon. Are these being used sufficiently to be maintained in the collection?

7. The current issues of a number of journals indexed in SSHI are presently subscribed to. Many of them, if not nearly all, could be dropped and replaced by others more likely to be used by undergraduates. Most of them are impersonal and erudite and could be replaced by others which reflect investigations closer to the experience of undergraduates.

8. Subscribe to Education Index.

FOOTNOTES

[1]H. A. Simon, "On a Class of Skew Distribution Functions," Biometrika, XLII (December, 1955), 439.

[2]The Office of Records and Registration, UNC, reports enrolment for the spring of 1972 as: 12,415 undergraduates; 2,988 freshmen.

[3]The English department complied with the regulation that student papers be retained for one year following their submission to the department, returned about twenty papers to students who wished them, and turned the rest over to B. Nielsen for research purposes.

[4]From the outline given to instructors of English 2, Argumentative Research Paper; and from conversations with Doris Betts, Chairman, Fresnman English, and W. McQueen, former Chairman, Freshman English.

[5]Students who receive above 700 on the College Board Entrance Examinations, or who score 4-5 on the Advanced Placement Test, are generally exempted from English 2.

[6]P. L. K. Gross and E. M. Gross, "College Libraries and Chemical Education," Science, LXVI (November, 1927), 385-89.

[7]C. H. Brown, Scientific Serials (ACRL Monographs, #16, Chicago: Association of College and Reference Libraries, 1956), p. 11.

[8]B. C. Vickery, "Periodical Sets: What Should You Buy?" ASLIB Proceedings, V (May, 1953), 70-73.

[9]J. W. Heussman, "The Literature Cited in Theological Journals and its Relationship to Seminary Library Circulation," (Unpublished Ph.D. thesis, University of Illinois, 1970), p. 196.

[10]R. E. Stevens, Characteristics of Subject Literatures (ACRL Monographs, #6, Chicago: Association of College and Reference Libraries, 1953), pp. 10-21.

[11]S. C. Bradford, Documentation (London: Crosby Lockwood, 1948), p. 116.

[12]T. Saracevic, "The Concept of Relevance in Information Science: A Historical Review," in Introduction to Information Science, edited by T. Saracevic (New York: R. R. Bowker Co., 1970), p. 144-45.

[13]Elizabeth Wilkinson, "The Ambiguity of Bradford's Law," Journal of Documentation, XXVIII (June, 1972), 122-30.

[14]B. C. Brookes, "Bradford's Law and the Bibliography of Science," Nature, CCXXIV (December, 1969), 953.

[15]In his search for a unifying theory to describe the dispersion of scientific journals, Dale Barker analyses intensively and illustrates graphically the models developed by Dalziel, Kendall and Bradford. Notwithstanding the different approaches taken by Kendall and Bradford, their equations are found to be mathematically equivalent. See Barker's dissertation, "Characteristics of the Scientific Literature Cited by Chemists in the Soviet Union" (unpublished Ph.D. thesis, University of Illinois, 1966) (Microfilmed), pp. 93 - 102.

[16]H. A. Simon describes the work of Yule in his article, "On a Class of Skew Distribution Functions," Biometrika, XLII (December, 1955), 433-39.

[17]Ibid.

[18]Ibid., 425.

[19]Philip M. Morse, Library Effectiveness: A Systems Approach (Cambridge: M. I. T. Press, 1968), p. 2-42.

[20]Barker, "Characteristics of the Scientific Literature Cited by Chemists in the Soviet Union," p. 99.

[21]Wilkinson, "The Ambiguity of Bradford's Law," p. 122.

[22]B. C. Brookes, "The Derivation and Application of the Bradford-Zipf Distribution," Journal of Documentation, XXIV (December, 1968), pp. 247-65.

[23]F. K. Leimkuhler, "The Bradford Distribution," Journal of Documentation, XXIII, 3 (September, 1967), 197-207.

[24]Statistics supplied by the English department at UNC on the basis of registration. Because the numbers were subject to depletion during the semester by withdrawals, failures and incompletes, the figure may have been a little high by the end of the semester.

[25]Periodicals and Other Serials Held by Libraries of the University of North Carolina at Chapel Hill. Chapel Hill: UNC, 1972.

[26]The source of indexing information was Ulrich's International Periodicals Directory. Edited by Leon Garry. 4th ed. New York: Oxbridge Publishing Co., 1973.

[27]In this case, 244 values associated with the variable, "Journal."

[28]Barker, "Characteristics of the Scientific Literature Cited by Chemists in the Soviet Union," p. 11.

[29]Stevens, Characteristics of Subject Literature, p. 12.

[30]Herman N. Henkle, "The Periodical Literature of Biochemistry," MLA Bulletin, XXVII (1938), cited by Dale Barker, "Characteristics of the Scientific Literature Cited by Chemists of the Soviet Union," p. 97.

[31]P. F. Cole, "A New Look at Reference Scattering," Journal of Documentation, XVIII (June, 1962), 58-64.

[32]Bernard Houghton, "Cut-back on Periodicals," New Library World, LXXIII (February, 1972), 210.

[33]Wilson O. Aiyepeku, "The Periodical Literature of Geography," Libri, XXII, 3 (1972), 169-82.

[34]Cole, "A New Look at Reference Scattering," 62.

[35]W. Katz, Magazines for Libraries (New York: R. R. Bowker, 1972), pp. 372, 585-86, 591-92.

[36]Ibid., p. 127.

[37]One periodical in this group is cited twice, but is included to keep the categories in multiples of ten.

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